



**Certified Mail - Return Receipt Requested**

February 8, 2010

Mr. Kyle Winter, PE  
Regional Deputy Director  
Piedmont Regional Office  
Virginia Department of Environmental Quality  
4949-A Cox Road  
Glen Allen, VA 23060

Subject: Old Dominion Electric Cooperative (ODEC) – Cypress Creek Power Station (CCPS) – December 2009 PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and Meteorological Data Review and Analysis. Registration Number: 52272

Dear Mr. Winter:

Please find enclosed a hard copy and CD containing the December 2009 Dendron Ambient Air and Meteorological Data Monitoring Report for CCPS. The data was collected to satisfy the air monitoring requirements as part of the Prevention of Significant Deterioration air permit application submitted to the Virginia Department of Environmental Quality (VDEQ).

The enclosed December 2009 report contains the following sections:

1. Reporting Units and Abbreviations. A listing of the engineering units and abbreviations contained in the report.
2. National Ambient Air Quality Standards (NAAQS). Summary of the U.S. Environmental Protection Agency's air quality standards for ozone as promulgated in 36 FR 8186 on April 30, 1971, and 73 FR 16436, March 27, 2008.
3. Missing Data Summary for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and Meteorological data. Explanation of the missing data for the reporting period.
4. Monthly Data Summary (PM<sub>10</sub>, PM<sub>2.5</sub> and SO<sub>2</sub>).
5. PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub> Monitoring Data.
6. SO<sub>2</sub> Zero, Span, and Precision (ZSP) worksheets, and PM<sub>10</sub> and PM<sub>2.5</sub> flow check worksheets.
7. PM<sub>10</sub>, PM<sub>2.5</sub> and SO<sub>2</sub> standard certifications.
8. Meteorological Data. The Dendron meteorological data including the raw SODAR data is included on the accompanying CD.

Mr. K. Winter  
February 8, 2009  
Page 2

The PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub> concentrations were found to be below the NAAQS for this reporting period. The ozone season ended on October 31<sup>st</sup>, therefore ozone concentrations are not included in the December Report.

The SODAR was audited on December 1<sup>st</sup>. A pulse transponding system was used to challenge the SODAR with known values of wind speed, direction, and altitude. The audit showed the SODAR was operating within manufacturer's specifications.

Mr. Mike Kiss with the VDEQ has requested that a comparison between the on-site SODAR and surface observations be included in our monthly reports. We have tabulated the hourly averaged surface observations and SODAR values and are developing a comparison between the surface observations and the wind data collected at the various SODAR gate levels.

An electronic copy of the monitoring report is available for download from ODEC's FTP website for Mr. C. Turner and Mr. M. Kiss of the DEQ. If you have any questions, feel free to call me at (804) 968-4045 or Mr. Dahlgren Vaughan at (804) 968-7149.

Sincerely,



David N. Smith  
Director of Environmental, Health and Safety Services

cc: Lisa D. Johnson  
Kenneth F. Alexander  
Charles Turner – VDEQ - (electronic FTP copy)  
Michael Kiss – VDEQ - (electronic FTP copy)  
Daniel Salkovitz – VDEQ – (electronic FTP copy)  
Robert Lute – VDEQ – (electronic FTP copy)

enclosure and CD

## DOCUMENT CERTIFICATION

**Facility Name:** Cypress Creek Power Station

**Registration No.** 52272

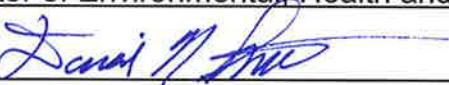
**Facility Location:** Dendron, VA (Surry County) US Hwy 460 to Wakefield, VA, turn east on VA Hwy 30, turn south on Faison St in Dendron, VA, continue for approximately 0.6 miles.

**Type of Submittal Attached:** CCPS – December 2009 PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and Meteorological Data Review and Analysis.

**Certification:** I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering and evaluating the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

**Name of Responsible Official (Print):** David N. Smith

**Title:** Director of Environmental Health and Safety Services

**Signature:**       **Date:** 2-8-10

Mr. K. Winter  
February 8, 2009  
Page 4

bcc: Mark Saito – Burns and McDonnell Engineering Company, Inc. (pdf copy)  
Dahlgren Vaughan (pdf copy)  
Laura Rose (pdf copy)  
CCD-3.1.1 (w/ enclosure and CD)

**Cypress Creek Power Station  
PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, and Meteorological Data**

**Prepared for  
Old Dominion Electric Cooperative  
Richmond, Virginia**

**December 2009 Data**

**Project 46111**

**Prepared By  
Burns & McDonnell Engineering Company, Inc.  
9400 Ward Parkway  
Kansas City, Missouri**

## **EXECUTIVE SUMMARY**

**OLD DOMINION ELECTRIC COOPERATIVE AMBIENT AIR  
AND METEOROLOGICAL MONITORING SYSTEM  
PERMIT NO. N/A  
PROJECT NO. 46111**

**Executive Summary**

The PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub> and meteorological data were collected to satisfy the air monitoring requirements as part of the Prevention of Significant Deterioration air permit application submitted to the Virginia Department of Environmental Quality (VDEQ).

The PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub> concentrations for December 2009 were all below the National Ambient Air Quality Standards for all averaging times.

We have tabulated the hourly averaged surface observations and SODAR values and are developing a comparison between the surface observations and the wind data collected at the various SODAR gate levels. The comparison with the Richmond airport is still under development.

The ozone season ended on October 31<sup>st</sup>. Therefore, ozone data is not included in the December report.

## **REPORTING UNITS AND ABBREVIATIONS**

**Old Dominion Electric Cooperative**  
**Ambient Air and Meteorological Monitoring System**  
**Permit No. N/A**  
**Project No. 46111**

**Reporting Units & Abbreviations**

	Description
2M Temp.	Temperature at 2 Meter Level in Degrees Celsius
10M Temp.	Temperature at 10 Meter Level in Degrees Celsius
Avg.	Average
Bar. Press.	Station Barometric Pressure in Millibars
C	Degrees Celsius
CE	Collection Error
Deg.	Degrees (from North)
F	Degrees Fahrenheit
Delta Temp.	Temperature Difference Between 10M Temp and 2M Temp
Dew Point	Dew Point at 2 Meter Level in Degrees Centigrade
FL	Filter Leak
InHg	Inches of Mercury
mm Hg	Millimeters of Mercury
m/s	Meters Per Second
m <sup>3</sup> /min	Cubic Meters Per Minute
µg/m <sup>3</sup>	Micrograms per Cubic Meter
MPH	Miles Per Hour
MR	Maintenance and Repair
NA	Data Not Available
NAN	Missing Data
Net. Rad.	Net Solar Radiation
ppb	Parts per Billion (Units of Ozone Concentration)
ppm	Parts per Million
%	Percent (Relative Humidity)
QA	Quality Assurance Audit
Prec.	Precipitation in Inches
R.H.	Relative Humidity at 2 Meter Level in Percent
std m <sup>3</sup>	Standard Cubic Meters
Sigma	Standard Deviation of Wind Direction
Solar Rad.	Solar Radiation in W/m <sup>2</sup>
W/m <sup>2</sup>	Watts Per Square Meter
WD	Wind Direction in Degrees from True North
WS	Wind Speed in m/s

## AIRS Missing Code Abbreviations

	Description
AA	Sample Pressure Out of Limits
AB	Technician Unavailable
AC	Construction/Repairs in Area
AD	Shelter Storm Damage
AE	Shelter Temperature Outside Limits
AF	Scheduled but not Collected
AG	Sample Time Out of Limits
AH	Sample Flow Rate Out of Limits
AI	Insufficient Data (Can't Calculate)
AJ	Filter Damage
AK	Filter Leak
AL	Voided by Operator
AM	Miscellaneous Void
AN	Machine Malfunction
AO	Bad Weather
AP	Vandalism
AQ	Collection Error
AR	Lab Error
AS	Poor Quality Assurance Results
AT	Calibration
AU	Monitoring Waived
AV	Power Failure (POWR)
AW	Wildlife Damage
AX	Precision Check (PREC)
AY	Q C Control Points (Zero/Span)
AZ	Q C Audit (AUDT)
BA	Maintenance/Routine Repairs
BB	Unable to Reach Site
BC	Multi-Point Calibration
BD	Auto Calibration
BE	Building/Site Repair
BF	Precision/Zero/Span
BG	Missing Ozone Data Not Likely to Exceed Level of Standard
BH	Interference/Co-Elution
BI	Lost or Damaged in Transit
BJ	Operator Error
BK	Site Computer/Data Logger Down

NATIONAL AMBIENT AIR QUALITY STANDARDS  
(NAAQS)

## SUMMARY OF NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Regulatory Citation	Primary Standard	Averaging Time	Secondary Standard
Particulate Matter (PM <sub>10</sub> )	40 CFR 50.6 52 FR 24663, July 1, 1987 59 FR 17375, April 12, 1994	150 µg/m <sup>3</sup>	24-hour	Same as Primary
Particulate Matter (PM <sub>2.5</sub> )	40 CFR 50 71 FR 61144, October 17, 2006	35 µg/m <sup>3</sup>	24-hour	Same as Primary
		15 µg/m <sup>3</sup>	Annual	
Sulfur Dioxide (SO <sub>2</sub> )	40 CFR 50.4 38 FR 25681, September 14, 1973	365 µg/m <sup>3</sup> (0.14 ppm)	24-hour	1300 µg/m <sup>3</sup> (0.5 ppm) 3-hour
		80 µg/m <sup>3</sup> (0.03 ppm)	Annual	
Ozone	40 CFR 50.9 44 FR 8220, February 8, 1979 58 FR 13008, March 9, 1993	0.12 ppm (235 µg/m <sup>3</sup> ) <sup>a</sup>	1-hour	Same as Primary
	40 CFR 50.10 73 FR 16436, March, 27, 2008	0.075 ppm (147 µg/m <sup>3</sup> ) <sup>b</sup>	8-hour	Same as Primary

<sup>a</sup> The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1.

<sup>b</sup> The standard is met when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to 0.075 ppm.

NOTE: All NAAQS except lead were originally promulgated 36 FR 8186, April 30, 1971.

ppm=Parts per million.

**MISSING DATA SUMMARY FOR  
PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub> AND METEOROLOGY**

**Old Dominion Electric Cooperative**  
**Ambient Air and Meteorological Monitoring System**  
**Permit No. N/A**  
**Project No. 46111**

**Missing Data Summary**  
**December 2009**

**1-Hour Ozone**

Date	Starting Time	Date	Ending Time	# of Samples Missing	Reason
Ozone season ended on October 31 <sup>st</sup> .					

Total Samples Possible

N/A

Total Valid Samples

N/A

Percent Data Capture

N/A

**8-Hour Ozone**

Date	Starting Time	Date	Ending Time	# of Samples Missing	Reason
Ozone season ended on October 31 <sup>st</sup> .					

Total Samples Possible

N/A

Total Valid Samples

N/A

Percent Data Capture

N/A

**PM<sub>10</sub> 24-Hour**

Date	Starting Time	Date	Ending Time	# of Samples Missing	Reason
None					

Total Samples Possible

31

Total Valid Samples

31

Percent Data Capture

100%

**PM<sub>2.5</sub> 24-Hour**

Date	Starting Time	Date	Ending Time	# of Samples Missing	Reason
None					

Total Samples Possible

31

Total Valid Samples

31

Percent Data Capture

100%

**SO<sub>2</sub> 3-Hour**

Date	Starting Time	Date	Ending Time	# of Samples Missing	Reason
12/16	14:00	12/16	14:00	1	ZSP
12/16	15:00	12/16	15:00	1	Multi-point Calibration

Total Samples Possible 744

Total Valid Samples 742

Percent Data Capture 99%

**SO<sub>2</sub> 24-Hour**

Date	Starting Time	Date	Ending Time	# of Samples Missing	Reason
				None	

Total Samples Possible 31

Total Valid Samples 31

Percent Data Capture 100%

**Old Dominion Electric Cooperative**  
**Ambient Air and Meteorological Monitoring System**  
**Permit No. N/A**  
**Project No. 46111**

**Missing Data Summary**  
**December 2009**

Dendron Meteorological Station

Parameter	Date	Starting Time	Date	Ending Time	# of Samples Missing	Reason
WS						
WD						
Sigma						
10M Temp						None
2M Temp						
Delta Temp						
R.H.						

Data Capture

Parameter	Total Samples Possible	Total Valid Samples	Percent Data Capture
WS	2,976	2,976	100%
WD	2,976	2,976	100%
Sigma	2,976	2,976	100%
10M Temp	2,976	2,976	100%
2M Temp	2,976	2,976	100%
Delta Temp	2,976	2,976	100%
R.H.	2,976	2,976	100%
Solar Rad	2,976	2,976	100%
Net. Rad	2,976	2,976	100%
Bar Press	2,976	2,976	100%
Precip.	2,976	2,976	100%

**MONTHLY DATA SUMMARY  
(PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub>)**

**OLD DOMINION ELECTRIC COOPERATIVE AMBIENT AIR  
AND METEOROLOGICAL MONITORING SYSTEM**  
**PERMIT NO. N/A**  
**PROJECT NO. 46111**

PM<sub>10</sub> Data Summary  
December 2009

Date	Hour	Max. Concentration ( $\mu\text{g}/\text{m}^3$ )	Avg. Wind Speed (m/s)	Avg. Wind Dir.	Avg. Temp. (C)
Maximum 24-Hour PM <sub>10</sub> Average					
12/24	00	12.1	0.99	358.09	1.64
Second Highest 24-Hour PM <sub>10</sub> Average					
12/23	00	10.5	0.95	343.13	0.67

PM<sub>2.5</sub> Data Summary  
December 2009

Date	Hour	Max. Concentration ( $\mu\text{g}/\text{m}^3$ )	Avg. Wind Speed (m/s)	Avg. Wind Dir.	Avg. Temp. (C)
Maximum 24-Hour PM <sub>2.5</sub> Average					
12/9	00	14.2	2.19	42.19	4.97
Second Highest 24-Hour PM <sub>2.5</sub> Average					
12/24	00	13.8	0.99	358.09	1.64

SO<sub>2</sub> Data Summary  
December 2009

Date	Hour	Max. Concentration (ppm)	Avg. Wind Speed (m/s)	Avg. Wind Dir.	Avg. Temp. (C)
Maximum 3-Hour SO <sub>2</sub> Average					
12/27	13	0.015	1.96	333.31	10.56
Second Highest 3-Hour SO <sub>2</sub> Average					
12/18	17	0.015	2.76	49.95	3.26
Maximum 24-Hour SO <sub>2</sub> Average					
12/24	00	0.005	0.99	358.09	1.64
Second Highest 24-Hour SO <sub>2</sub> Average					
12/31	00	0.005	0.88	341.28	3.00

**Ozone Data Summary**  
**December 2009**

Date	Hour	Max. Concentration (ppm)	Avg. Wind Speed (m/s)	Avg. Wind Dir.	Avg. Temp. (C)
Maximum Hourly Ozone Average					
Ozone season ended on October 31 <sup>st</sup> .					
Second Highest Hourly Ozone Average					
Ozone season ended on October 31 <sup>st</sup> .					
Maximum 8-Hour Ozone Average					
Ozone season ended on October 31 <sup>st</sup> .					
Second Highest 8-Hour Ozone Average					
Ozone season ended on October 31 <sup>st</sup> .					

**Rolling Annual Averages**  
**2009**

Month	PM <sub>2.5</sub> * ( $\mu\text{g}/\text{m}^3$ )	SO <sub>2</sub> (ppm)
May	N/A	0.001
June	N/A	0.001
July	N/A	0.001
August	14.6	0.001
September	10.2	0.001
October	7.2	0.002
November	9.7	0.002
December	9.3	0.002

\*Average beginning August 6, 2009 when new monitor began operation

**PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub> MONITORING DATA**

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2,5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/1/09 0:00	N/A	N/A	0.002	0.003	5.1	9.1
12/1/09 1:00	N/A	N/A	0.002			
12/1/09 2:00	N/A	N/A	0.002			
12/1/09 3:00	N/A	N/A	0.002			
12/1/09 4:00	N/A	N/A	0.002			
12/1/09 5:00	N/A	N/A	0.002			
12/1/09 6:00	N/A	N/A	0.002			
12/1/09 7:00	N/A	N/A	0.002			
12/1/09 8:00	N/A	N/A	0.002			
12/1/09 9:00	N/A	N/A	0.002			
12/1/09 10:00	N/A	N/A	0.002			
12/1/09 11:00	N/A	N/A	0.002			
12/1/09 12:00	N/A	N/A	0.003			
12/1/09 13:00	N/A	N/A	0.002			
12/1/09 14:00	N/A	N/A	0.002			
12/1/09 15:00	N/A	N/A	0.002			
12/1/09 16:00	N/A	N/A	0.002			
12/1/09 17:00	N/A	N/A	0.002			
12/1/09 18:00	N/A	N/A	0.002			
12/1/09 19:00	N/A	N/A	0.002			
12/1/09 20:00	N/A	N/A	0.002			
12/1/09 21:00	N/A	N/A	0.002			
12/1/09 22:00	N/A	N/A	0.002			
12/1/09 23:00	N/A	N/A	0.002			
12/2/09 0:00	N/A	N/A	0.002	0.002	4.6	6.5
12/2/09 1:00	N/A	N/A	0.002			
12/2/09 2:00	N/A	N/A	0.002			
12/2/09 3:00	N/A	N/A	0.002			
12/2/09 4:00	N/A	N/A	0.002			
12/2/09 5:00	N/A	N/A	0.002			
12/2/09 6:00	N/A	N/A	0.002			
12/2/09 7:00	N/A	N/A	0.002			
12/2/09 8:00	N/A	N/A	0.002			
12/2/09 9:00	N/A	N/A	0.003			
12/2/09 10:00	N/A	N/A	0.004			
12/2/09 11:00	N/A	N/A	0.004			
12/2/09 12:00	N/A	N/A	0.004			
12/2/09 13:00	N/A	N/A	0.004			
12/2/09 14:00	N/A	N/A	0.004			
12/2/09 15:00	N/A	N/A	0.005			
12/2/09 16:00	N/A	N/A	0.004			
12/2/09 17:00	N/A	N/A	0.002			
12/2/09 18:00	N/A	N/A	0.002			
12/2/09 19:00	N/A	N/A	0.002			
12/2/09 20:00	N/A	N/A	0.002			
12/2/09 21:00	N/A	N/A	0.002			
12/2/09 22:00	N/A	N/A	0.002			
12/2/09 23:00	N/A	N/A	0.002			
12/3/09 0:00	N/A	N/A	0.002	0.003	6.9	6.0
12/3/09 1:00	N/A	N/A	0.002			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2.5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/3/09 2:00	N/A	N/A	0.002			
12/3/09 3:00	N/A	N/A	0.002			
12/3/09 4:00	N/A	N/A	0.002			
12/3/09 5:00	N/A	N/A	0.002			
12/3/09 6:00	N/A	N/A	0.002			
12/3/09 7:00	N/A	N/A	0.002			
12/3/09 8:00	N/A	N/A	0.002			
12/3/09 9:00	N/A	N/A	0.002			
12/3/09 10:00	N/A	N/A	0.002			
12/3/09 11:00	N/A	N/A	0.002			
12/3/09 12:00	N/A	N/A	0.002			
12/3/09 13:00	N/A	N/A	0.002			
12/3/09 14:00	N/A	N/A	0.002			
12/3/09 15:00	N/A	N/A	0.002			
12/3/09 16:00	N/A	N/A	0.002			
12/3/09 17:00	N/A	N/A	0.002			
12/3/09 18:00	N/A	N/A	0.002			
12/3/09 19:00	N/A	N/A	0.002			
12/3/09 20:00	N/A	N/A	0.002			
12/3/09 21:00	N/A	N/A	0.002			
12/3/09 22:00	N/A	N/A	0.002			
12/3/09 23:00	N/A	N/A	0.002			
12/4/09 0:00	N/A	N/A	0.002	0.002	8.2	5.2
12/4/09 1:00	N/A	N/A	0.002			
12/4/09 2:00	N/A	N/A	0.002			
12/4/09 3:00	N/A	N/A	0.002			
12/4/09 4:00	N/A	N/A	0.002			
12/4/09 5:00	N/A	N/A	0.002			
12/4/09 6:00	N/A	N/A	0.002			
12/4/09 7:00	N/A	N/A	0.002			
12/4/09 8:00	N/A	N/A	0.002			
12/4/09 9:00	N/A	N/A	0.002			
12/4/09 10:00	N/A	N/A	0.002			
12/4/09 11:00	N/A	N/A	0.002			
12/4/09 12:00	N/A	N/A	0.004			
12/4/09 13:00	N/A	N/A	0.004			
12/4/09 14:00	N/A	N/A	0.004			
12/4/09 15:00	N/A	N/A	0.003			
12/4/09 16:00	N/A	N/A	0.003			
12/4/09 17:00	N/A	N/A	0.003			
12/4/09 18:00	N/A	N/A	0.003			
12/4/09 19:00	N/A	N/A	0.003			
12/4/09 20:00	N/A	N/A	0.002			
12/4/09 21:00	N/A	N/A	0.002			
12/4/09 22:00	N/A	N/A	0.002			
12/4/09 23:00	N/A	N/A	0.002			
12/5/09 0:00	N/A	N/A	0.002	0.002	7.9	7.7
12/5/09 1:00	N/A	N/A	0.002			
12/5/09 2:00	N/A	N/A	0.003			
12/5/09 3:00	N/A	N/A	0.003			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2.5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/5/09 4:00	N/A	N/A	0.003			
12/5/09 5:00	N/A	N/A	0.002			
12/5/09 6:00	N/A	N/A	0.002			
12/5/09 7:00	N/A	N/A	0.002			
12/5/09 8:00	N/A	N/A	0.002			
12/5/09 9:00	N/A	N/A	0.002			
12/5/09 10:00	N/A	N/A	0.002			
12/5/09 11:00	N/A	N/A	0.002			
12/5/09 12:00	N/A	N/A	0.002			
12/5/09 13:00	N/A	N/A	0.002			
12/5/09 14:00	N/A	N/A	0.002			
12/5/09 15:00	N/A	N/A	0.002			
12/5/09 16:00	N/A	N/A	0.002			
12/5/09 17:00	N/A	N/A	0.003			
12/5/09 18:00	N/A	N/A	0.003			
12/5/09 19:00	N/A	N/A	0.004			
12/5/09 20:00	N/A	N/A	0.004			
12/5/09 21:00	N/A	N/A	0.003			
12/5/09 22:00	N/A	N/A	0.003			
12/5/09 23:00	N/A	N/A	0.003			
12/6/09 0:00	N/A	N/A	0.003	0.003	5.5	4.4
12/6/09 1:00	N/A	N/A	0.004			
12/6/09 2:00	N/A	N/A	0.005			
12/6/09 3:00	N/A	N/A	0.006			
12/6/09 4:00	N/A	N/A	0.006			
12/6/09 5:00	N/A	N/A	0.005			
12/6/09 6:00	N/A	N/A	0.005			
12/6/09 7:00	N/A	N/A	0.005			
12/6/09 8:00	N/A	N/A	0.005			
12/6/09 9:00	N/A	N/A	0.005			
12/6/09 10:00	N/A	N/A	0.005			
12/6/09 11:00	N/A	N/A	0.005			
12/6/09 12:00	N/A	N/A	0.005			
12/6/09 13:00	N/A	N/A	0.004			
12/6/09 14:00	N/A	N/A	0.004			
12/6/09 15:00	N/A	N/A	0.004			
12/6/09 16:00	N/A	N/A	0.004			
12/6/09 17:00	N/A	N/A	0.004			
12/6/09 18:00	N/A	N/A	0.003			
12/6/09 19:00	N/A	N/A	0.003			
12/6/09 20:00	N/A	N/A	0.003			
12/6/09 21:00	N/A	N/A	0.002			
12/6/09 22:00	N/A	N/A	0.002			
12/6/09 23:00	N/A	N/A	0.002			
12/7/09 0:00	N/A	N/A	0.002	0.004	9.7	10.8
12/7/09 1:00	N/A	N/A	0.002			
12/7/09 2:00	N/A	N/A	0.002			
12/7/09 3:00	N/A	N/A	0.002			
12/7/09 4:00	N/A	N/A	0.002			
12/7/09 5:00	N/A	N/A	0.002			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2.5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/7/09 6:00	N/A	N/A	0.002			
12/7/09 7:00	N/A	N/A	0.002			
12/7/09 8:00	N/A	N/A	0.002			
12/7/09 9:00	N/A	N/A	0.003			
12/7/09 10:00	N/A	N/A	0.004			
12/7/09 11:00	N/A	N/A	0.006			
12/7/09 12:00	N/A	N/A	0.006			
12/7/09 13:00	N/A	N/A	0.006			
12/7/09 14:00	N/A	N/A	0.005			
12/7/09 15:00	N/A	N/A	0.004			
12/7/09 16:00	N/A	N/A	0.003			
12/7/09 17:00	N/A	N/A	0.003			
12/7/09 18:00	N/A	N/A	0.003			
12/7/09 19:00	N/A	N/A	0.003			
12/7/09 20:00	N/A	N/A	0.003			
12/7/09 21:00	N/A	N/A	0.002			
12/7/09 22:00	N/A	N/A	0.002			
12/7/09 23:00	N/A	N/A	0.002			
12/8/09 0:00	N/A	N/A	0.002	0.003	9.9	12.4
12/8/09 1:00	N/A	N/A	0.002			
12/8/09 2:00	N/A	N/A	0.002			
12/8/09 3:00	N/A	N/A	0.002			
12/8/09 4:00	N/A	N/A	0.003			
12/8/09 5:00	N/A	N/A	0.004			
12/8/09 6:00	N/A	N/A	0.004			
12/8/09 7:00	N/A	N/A	0.003			
12/8/09 8:00	N/A	N/A	0.003			
12/8/09 9:00	N/A	N/A	0.004			
12/8/09 10:00	N/A	N/A	0.004			
12/8/09 11:00	N/A	N/A	0.004			
12/8/09 12:00	N/A	N/A	0.003			
12/8/09 13:00	N/A	N/A	0.003			
12/8/09 14:00	N/A	N/A	0.003			
12/8/09 15:00	N/A	N/A	0.005			
12/8/09 16:00	N/A	N/A	0.007			
12/8/09 17:00	N/A	N/A	0.007			
12/8/09 18:00	N/A	N/A	0.005			
12/8/09 19:00	N/A	N/A	0.003			
12/8/09 20:00	N/A	N/A	0.003			
12/8/09 21:00	N/A	N/A	0.003			
12/8/09 22:00	N/A	N/A	0.003			
12/8/09 23:00	N/A	N/A	0.002			
12/9/09 0:00	N/A	N/A	0.002	0.004	10.3	14.2
12/9/09 1:00	N/A	N/A	0.002			
12/9/09 2:00	N/A	N/A	0.002			
12/9/09 3:00	N/A	N/A	0.002			
12/9/09 4:00	N/A	N/A	0.002			
12/9/09 5:00	N/A	N/A	0.002			
12/9/09 6:00	N/A	N/A	0.002			
12/9/09 7:00	N/A	N/A	0.002			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2.5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/9/09 8:00	N/A	N/A	0.002			
12/9/09 9:00	N/A	N/A	0.002			
12/9/09 10:00	N/A	N/A	0.002			
12/9/09 11:00	N/A	N/A	0.002			
12/9/09 12:00	N/A	N/A	0.002			
12/9/09 13:00	N/A	N/A	0.002			
12/9/09 14:00	N/A	N/A	0.002			
12/9/09 15:00	N/A	N/A	0.002			
12/9/09 16:00	N/A	N/A	0.002			
12/9/09 17:00	N/A	N/A	0.002			
12/9/09 18:00	N/A	N/A	0.002			
12/9/09 19:00	N/A	N/A	0.002			
12/9/09 20:00	N/A	N/A	0.002			
12/9/09 21:00	N/A	N/A	0.002			
12/9/09 22:00	N/A	N/A	0.002			
12/9/09 23:00	N/A	N/A	0.002			
12/10/09 0:00	N/A	N/A	0.002	0.002	6.7	4.8
12/10/09 1:00	N/A	N/A	0.002			
12/10/09 2:00	N/A	N/A	0.002			
12/10/09 3:00	N/A	N/A	0.002			
12/10/09 4:00	N/A	N/A	0.002			
12/10/09 5:00	N/A	N/A	0.002			
12/10/09 6:00	N/A	N/A	0.002			
12/10/09 7:00	N/A	N/A	0.002			
12/10/09 8:00	N/A	N/A	0.002			
12/10/09 9:00	N/A	N/A	0.002			
12/10/09 10:00	N/A	N/A	0.002			
12/10/09 11:00	N/A	N/A	0.002			
12/10/09 12:00	N/A	N/A	0.002			
12/10/09 13:00	N/A	N/A	0.002			
12/10/09 14:00	N/A	N/A	0.002			
12/10/09 15:00	N/A	N/A	0.002			
12/10/09 16:00	N/A	N/A	0.002			
12/10/09 17:00	N/A	N/A	0.002			
12/10/09 18:00	N/A	N/A	0.002			
12/10/09 19:00	N/A	N/A	0.002			
12/10/09 20:00	N/A	N/A	0.002			
12/10/09 21:00	N/A	N/A	0.002			
12/10/09 22:00	N/A	N/A	0.002			
12/10/09 23:00	N/A	N/A	0.002			
12/11/09 0:00	N/A	N/A	0.002	0.002	8.8	7.4
12/11/09 1:00	N/A	N/A	0.002			
12/11/09 2:00	N/A	N/A	0.002			
12/11/09 3:00	N/A	N/A	0.002			
12/11/09 4:00	N/A	N/A	0.002			
12/11/09 5:00	N/A	N/A	0.002			
12/11/09 6:00	N/A	N/A	0.002			
12/11/09 7:00	N/A	N/A	0.002			
12/11/09 8:00	N/A	N/A	0.002			
12/11/09 9:00	N/A	N/A	0.003			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2.5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/11/09 10:00	N/A	N/A	0.003			
12/11/09 11:00	N/A	N/A	0.003			
12/11/09 12:00	N/A	N/A	0.003			
12/11/09 13:00	N/A	N/A	0.003			
12/11/09 14:00	N/A	N/A	0.003			
12/11/09 15:00	N/A	N/A	0.003			
12/11/09 16:00	N/A	N/A	0.002			
12/11/09 17:00	N/A	N/A	0.002			
12/11/09 18:00	N/A	N/A	0.002			
12/11/09 19:00	N/A	N/A	0.002			
12/11/09 20:00	N/A	N/A	0.002			
12/11/09 21:00	N/A	N/A	0.002			
12/11/09 22:00	N/A	N/A	0.002			
12/11/09 23:00	N/A	N/A	0.003			
12/12/09 0:00	N/A	N/A	0.003	0.002	7.3	4.5
12/12/09 1:00	N/A	N/A	0.003			
12/12/09 2:00	N/A	N/A	0.003			
12/12/09 3:00	N/A	N/A	0.003			
12/12/09 4:00	N/A	N/A	0.003			
12/12/09 5:00	N/A	N/A	0.003			
12/12/09 6:00	N/A	N/A	0.002			
12/12/09 7:00	N/A	N/A	0.002			
12/12/09 8:00	N/A	N/A	0.002			
12/12/09 9:00	N/A	N/A	0.003			
12/12/09 10:00	N/A	N/A	0.006			
12/12/09 11:00	N/A	N/A	0.008			
12/12/09 12:00	N/A	N/A	0.009			
12/12/09 13:00	N/A	N/A	0.006			
12/12/09 14:00	N/A	N/A	0.004			
12/12/09 15:00	N/A	N/A	0.003			
12/12/09 16:00	N/A	N/A	0.003			
12/12/09 17:00	N/A	N/A	0.003			
12/12/09 18:00	N/A	N/A	0.003			
12/12/09 19:00	N/A	N/A	0.003			
12/12/09 20:00	N/A	N/A	0.003			
12/12/09 21:00	N/A	N/A	0.003			
12/12/09 22:00	N/A	N/A	0.004			
12/12/09 23:00	N/A	N/A	0.004			
12/13/09 0:00	N/A	N/A	0.003	0.004	7.7	6.9
12/13/09 1:00	N/A	N/A	0.003			
12/13/09 2:00	N/A	N/A	0.002			
12/13/09 3:00	N/A	N/A	0.002			
12/13/09 4:00	N/A	N/A	0.002			
12/13/09 5:00	N/A	N/A	0.002			
12/13/09 6:00	N/A	N/A	0.002			
12/13/09 7:00	N/A	N/A	0.002			
12/13/09 8:00	N/A	N/A	0.002			
12/13/09 9:00	N/A	N/A	0.002			
12/13/09 10:00	N/A	N/A	0.002			
12/13/09 11:00	N/A	N/A	0.002			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2.5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/13/09 12:00	N/A	N/A	0.002			
12/13/09 13:00	N/A	N/A	0.002			
12/13/09 14:00	N/A	N/A	0.002			
12/13/09 15:00	N/A	N/A	0.002			
12/13/09 16:00	N/A	N/A	0.002			
12/13/09 17:00	N/A	N/A	0.002			
12/13/09 18:00	N/A	N/A	0.002			
12/13/09 19:00	N/A	N/A	0.002			
12/13/09 20:00	N/A	N/A	0.002			
12/13/09 21:00	N/A	N/A	0.002			
12/13/09 22:00	N/A	N/A	0.002			
12/13/09 23:00	N/A	N/A	0.002			
12/14/09 0:00	N/A	N/A	0.002	0.002	4.7	5.3
12/14/09 1:00	N/A	N/A	0.002			
12/14/09 2:00	N/A	N/A	0.002			
12/14/09 3:00	N/A	N/A	0.002			
12/14/09 4:00	N/A	N/A	0.002			
12/14/09 5:00	N/A	N/A	0.002			
12/14/09 6:00	N/A	N/A	0.002			
12/14/09 7:00	N/A	N/A	0.002			
12/14/09 8:00	N/A	N/A	0.002			
12/14/09 9:00	N/A	N/A	0.002			
12/14/09 10:00	N/A	N/A	0.002			
12/14/09 11:00	N/A	N/A	0.002			
12/14/09 12:00	N/A	N/A	0.002			
12/14/09 13:00	N/A	N/A	0.003			
12/14/09 14:00	N/A	N/A	0.003			
12/14/09 15:00	N/A	N/A	0.003			
12/14/09 16:00	N/A	N/A	0.003			
12/14/09 17:00	N/A	N/A	0.003			
12/14/09 18:00	N/A	N/A	0.003			
12/14/09 19:00	N/A	N/A	0.003			
12/14/09 20:00	N/A	N/A	0.003			
12/14/09 21:00	N/A	N/A	0.003			
12/14/09 22:00	N/A	N/A	0.003			
12/14/09 23:00	N/A	N/A	0.002			
12/15/09 0:00	N/A	N/A	0.002	0.002	6.3	6.5
12/15/09 1:00	N/A	N/A	0.002			
12/15/09 2:00	N/A	N/A	0.002			
12/15/09 3:00	N/A	N/A	0.002			
12/15/09 4:00	N/A	N/A	0.002			
12/15/09 5:00	N/A	N/A	0.002			
12/15/09 6:00	N/A	N/A	0.002			
12/15/09 7:00	N/A	N/A	0.002			
12/15/09 8:00	N/A	N/A	0.002			
12/15/09 9:00	N/A	N/A	0.002			
12/15/09 10:00	N/A	N/A	0.002			
12/15/09 11:00	N/A	N/A	0.002			
12/15/09 12:00	N/A	N/A	0.002			
12/15/09 13:00	N/A	N/A	0.002			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2.5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/15/09 14:00	N/A	N/A	0.002			
12/15/09 15:00	N/A	N/A	0.002			
12/15/09 16:00	N/A	N/A	0.002			
12/15/09 17:00	N/A	N/A	0.002			
12/15/09 18:00	N/A	N/A	0.002			
12/15/09 19:00	N/A	N/A	0.002			
12/15/09 20:00	N/A	N/A	0.003			
12/15/09 21:00	N/A	N/A	0.003			
12/15/09 22:00	N/A	N/A	0.005			
12/15/09 23:00	N/A	N/A	0.005			
12/16/09 0:00	N/A	N/A	0.004	0.003	10.4	10.5
12/16/09 1:00	N/A	N/A	0.003			
12/16/09 2:00	N/A	N/A	0.003			
12/16/09 3:00	N/A	N/A	0.003			
12/16/09 4:00	N/A	N/A	0.002			
12/16/09 5:00	N/A	N/A	0.002			
12/16/09 6:00	N/A	N/A	0.002			
12/16/09 7:00	N/A	N/A	0.002			
12/16/09 8:00	N/A	N/A	0.002			
12/16/09 9:00	N/A	N/A	0.002			
12/16/09 10:00	N/A	N/A	0.002			
12/16/09 11:00	N/A	N/A	0.002			
12/16/09 12:00	N/A	N/A	0.002			
12/16/09 13:00	N/A	N/A	0.003			
12/16/09 14:00	N/A	N/A	BF			
12/16/09 15:00	N/A	N/A	BC			
12/16/09 16:00	N/A	N/A	0.005			
12/16/09 17:00	N/A	N/A	0.005			
12/16/09 18:00	N/A	N/A	0.005			
12/16/09 19:00	N/A	N/A	0.004			
12/16/09 20:00	N/A	N/A	0.003			
12/16/09 21:00	N/A	N/A	0.002			
12/16/09 22:00	N/A	N/A	0.002			
12/16/09 23:00	N/A	N/A	0.002			
12/17/09 0:00	N/A	N/A	0.002	0.003	8.5	7.8
12/17/09 1:00	N/A	N/A	0.002			
12/17/09 2:00	N/A	N/A	0.002			
12/17/09 3:00	N/A	N/A	0.002			
12/17/09 4:00	N/A	N/A	0.003			
12/17/09 5:00	N/A	N/A	0.003			
12/17/09 6:00	N/A	N/A	0.004			
12/17/09 7:00	N/A	N/A	0.004			
12/17/09 8:00	N/A	N/A	0.004			
12/17/09 9:00	N/A	N/A	0.004			
12/17/09 10:00	N/A	N/A	0.005			
12/17/09 11:00	N/A	N/A	0.006			
12/17/09 12:00	N/A	N/A	0.006			
12/17/09 13:00	N/A	N/A	0.006			
12/17/09 14:00	N/A	N/A	0.005			
12/17/09 15:00	N/A	N/A	0.005			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2,5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/17/09 16:00	N/A	N/A	0.005			
12/17/09 17:00	N/A	N/A	0.005			
12/17/09 18:00	N/A	N/A	0.004			
12/17/09 19:00	N/A	N/A	0.004			
12/17/09 20:00	N/A	N/A	0.004			
12/17/09 21:00	N/A	N/A	0.003			
12/17/09 22:00	N/A	N/A	0.003			
12/17/09 23:00	N/A	N/A	0.002			
12/18/09 0:00	N/A	N/A	0.002	0.004	8.6	10.2
12/18/09 1:00	N/A	N/A	0.002			
12/18/09 2:00	N/A	N/A	0.002			
12/18/09 3:00	N/A	N/A	0.002			
12/18/09 4:00	N/A	N/A	0.002			
12/18/09 5:00	N/A	N/A	0.002			
12/18/09 6:00	N/A	N/A	0.003			
12/18/09 7:00	N/A	N/A	0.003			
12/18/09 8:00	N/A	N/A	0.003			
12/18/09 9:00	N/A	N/A	0.003			
12/18/09 10:00	N/A	N/A	0.003			
12/18/09 11:00	N/A	N/A	0.003			
12/18/09 12:00	N/A	N/A	0.003			
12/18/09 13:00	N/A	N/A	0.003			
12/18/09 14:00	N/A	N/A	0.003			
12/18/09 15:00	N/A	N/A	0.006			
12/18/09 16:00	N/A	N/A	0.011			
12/18/09 17:00	N/A	N/A	0.015			
12/18/09 18:00	N/A	N/A	0.014			
12/18/09 19:00	N/A	N/A	0.009			
12/18/09 20:00	N/A	N/A	0.005			
12/18/09 21:00	N/A	N/A	0.003			
12/18/09 22:00	N/A	N/A	0.002			
12/18/09 23:00	N/A	N/A	0.002			
12/19/09 0:00	N/A	N/A	0.002	0.004	6.0	9.2
12/19/09 1:00	N/A	N/A	0.002			
12/19/09 2:00	N/A	N/A	0.002			
12/19/09 3:00	N/A	N/A	0.002			
12/19/09 4:00	N/A	N/A	0.002			
12/19/09 5:00	N/A	N/A	0.002			
12/19/09 6:00	N/A	N/A	0.002			
12/19/09 7:00	N/A	N/A	0.002			
12/19/09 8:00	N/A	N/A	0.002			
12/19/09 9:00	N/A	N/A	0.002			
12/19/09 10:00	N/A	N/A	0.002			
12/19/09 11:00	N/A	N/A	0.002			
12/19/09 12:00	N/A	N/A	0.002			
12/19/09 13:00	N/A	N/A	0.002			
12/19/09 14:00	N/A	N/A	0.003			
12/19/09 15:00	N/A	N/A	0.005			
12/19/09 16:00	N/A	N/A	0.005			
12/19/09 17:00	N/A	N/A	0.005			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2.5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/19/09 18:00	N/A	N/A	0.004			
12/19/09 19:00	N/A	N/A	0.003			
12/19/09 20:00	N/A	N/A	0.003			
12/19/09 21:00	N/A	N/A	0.003			
12/19/09 22:00	N/A	N/A	0.003			
12/19/09 23:00	N/A	N/A	0.003			
12/20/09 0:00	N/A	N/A	0.003	0.003	4.1	3.6
12/20/09 1:00	N/A	N/A	0.004			
12/20/09 2:00	N/A	N/A	0.004			
12/20/09 3:00	N/A	N/A	0.004			
12/20/09 4:00	N/A	N/A	0.003			
12/20/09 5:00	N/A	N/A	0.003			
12/20/09 6:00	N/A	N/A	0.002			
12/20/09 7:00	N/A	N/A	0.002			
12/20/09 8:00	N/A	N/A	0.002			
12/20/09 9:00	N/A	N/A	0.003			
12/20/09 10:00	N/A	N/A	0.003			
12/20/09 11:00	N/A	N/A	0.004			
12/20/09 12:00	N/A	N/A	0.005			
12/20/09 13:00	N/A	N/A	0.008			
12/20/09 14:00	N/A	N/A	0.009			
12/20/09 15:00	N/A	N/A	0.009			
12/20/09 16:00	N/A	N/A	0.006			
12/20/09 17:00	N/A	N/A	0.004			
12/20/09 18:00	N/A	N/A	0.003			
12/20/09 19:00	N/A	N/A	0.004			
12/20/09 20:00	N/A	N/A	0.004			
12/20/09 21:00	N/A	N/A	0.003			
12/20/09 22:00	N/A	N/A	0.003			
12/20/09 23:00	N/A	N/A	0.006			
12/21/09 0:00	N/A	N/A	0.010	0.005	7.6	8.2
12/21/09 1:00	N/A	N/A	0.010			
12/21/09 2:00	N/A	N/A	0.007			
12/21/09 3:00	N/A	N/A	0.004			
12/21/09 4:00	N/A	N/A	0.006			
12/21/09 5:00	N/A	N/A	0.007			
12/21/09 6:00	N/A	N/A	0.006			
12/21/09 7:00	N/A	N/A	0.005			
12/21/09 8:00	N/A	N/A	0.004			
12/21/09 9:00	N/A	N/A	0.003			
12/21/09 10:00	N/A	N/A	0.003			
12/21/09 11:00	N/A	N/A	0.004			
12/21/09 12:00	N/A	N/A	0.005			
12/21/09 13:00	N/A	N/A	0.005			
12/21/09 14:00	N/A	N/A	0.004			
12/21/09 15:00	N/A	N/A	0.003			
12/21/09 16:00	N/A	N/A	0.003			
12/21/09 17:00	N/A	N/A	0.003			
12/21/09 18:00	N/A	N/A	0.003			
12/21/09 19:00	N/A	N/A	0.003			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2,5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/21/09 20:00	N/A	N/A	0.003			
12/21/09 21:00	N/A	N/A	0.002			
12/21/09 22:00	N/A	N/A	0.002			
12/21/09 23:00	N/A	N/A	0.002			
12/22/09 0:00	N/A	N/A	0.002	0.004	8.8	11.2
12/22/09 1:00	N/A	N/A	0.002			
12/22/09 2:00	N/A	N/A	0.002			
12/22/09 3:00	N/A	N/A	0.002			
12/22/09 4:00	N/A	N/A	0.002			
12/22/09 5:00	N/A	N/A	0.002			
12/22/09 6:00	N/A	N/A	0.002			
12/22/09 7:00	N/A	N/A	0.002			
12/22/09 8:00	N/A	N/A	0.002			
12/22/09 9:00	N/A	N/A	0.002			
12/22/09 10:00	N/A	N/A	0.002			
12/22/09 11:00	N/A	N/A	0.004			
12/22/09 12:00	N/A	N/A	0.005			
12/22/09 13:00	N/A	N/A	0.005			
12/22/09 14:00	N/A	N/A	0.005			
12/22/09 15:00	N/A	N/A	0.005			
12/22/09 16:00	N/A	N/A	0.005			
12/22/09 17:00	N/A	N/A	0.004			
12/22/09 18:00	N/A	N/A	0.004			
12/22/09 19:00	N/A	N/A	0.004			
12/22/09 20:00	N/A	N/A	0.003			
12/22/09 21:00	N/A	N/A	0.003			
12/22/09 22:00	N/A	N/A	0.002			
12/22/09 23:00	N/A	N/A	0.002			
12/23/09 0:00	N/A	N/A	0.002	0.003	10.5	12.3
12/23/09 1:00	N/A	N/A	0.003			
12/23/09 2:00	N/A	N/A	0.003			
12/23/09 3:00	N/A	N/A	0.004			
12/23/09 4:00	N/A	N/A	0.004			
12/23/09 5:00	N/A	N/A	0.003			
12/23/09 6:00	N/A	N/A	0.003			
12/23/09 7:00	N/A	N/A	0.002			
12/23/09 8:00	N/A	N/A	0.002			
12/23/09 9:00	N/A	N/A	0.002			
12/23/09 10:00	N/A	N/A	0.003			
12/23/09 11:00	N/A	N/A	0.005			
12/23/09 12:00	N/A	N/A	0.006			
12/23/09 13:00	N/A	N/A	0.007			
12/23/09 14:00	N/A	N/A	0.007			
12/23/09 15:00	N/A	N/A	0.007			
12/23/09 16:00	N/A	N/A	0.008			
12/23/09 17:00	N/A	N/A	0.010			
12/23/09 18:00	N/A	N/A	0.012			
12/23/09 19:00	N/A	N/A	0.012			
12/23/09 20:00	N/A	N/A	0.009			
12/23/09 21:00	N/A	N/A	0.006			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2,5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/23/09 22:00	N/A	N/A	0.004			
12/23/09 23:00	N/A	N/A	0.003			
12/24/09 0:00	N/A	N/A	0.003	0.005	12.1	13.8
12/24/09 1:00	N/A	N/A	0.003			
12/24/09 2:00	N/A	N/A	0.003			
12/24/09 3:00	N/A	N/A	0.003			
12/24/09 4:00	N/A	N/A	0.003			
12/24/09 5:00	N/A	N/A	0.004			
12/24/09 6:00	N/A	N/A	0.005			
12/24/09 7:00	N/A	N/A	0.006			
12/24/09 8:00	N/A	N/A	0.005			
12/24/09 9:00	N/A	N/A	0.005			
12/24/09 10:00	N/A	N/A	0.005			
12/24/09 11:00	N/A	N/A	0.004			
12/24/09 12:00	N/A	N/A	0.003			
12/24/09 13:00	N/A	N/A	0.003			
12/24/09 14:00	N/A	N/A	0.003			
12/24/09 15:00	N/A	N/A	0.003			
12/24/09 16:00	N/A	N/A	0.003			
12/24/09 17:00	N/A	N/A	0.002			
12/24/09 18:00	N/A	N/A	0.004			
12/24/09 19:00	N/A	N/A	0.006			
12/24/09 20:00	N/A	N/A	0.009			
12/24/09 21:00	N/A	N/A	0.008			
12/24/09 22:00	N/A	N/A	0.006			
12/24/09 23:00	N/A	N/A	0.003			
12/25/09 0:00	N/A	N/A	0.002	0.004	7.8	9.2
12/25/09 1:00	N/A	N/A	0.002			
12/25/09 2:00	N/A	N/A	0.003			
12/25/09 3:00	N/A	N/A	0.003			
12/25/09 4:00	N/A	N/A	0.003			
12/25/09 5:00	N/A	N/A	0.002			
12/25/09 6:00	N/A	N/A	0.002			
12/25/09 7:00	N/A	N/A	0.002			
12/25/09 8:00	N/A	N/A	0.002			
12/25/09 9:00	N/A	N/A	0.004			
12/25/09 10:00	N/A	N/A	0.004			
12/25/09 11:00	N/A	N/A	0.004			
12/25/09 12:00	N/A	N/A	0.003			
12/25/09 13:00	N/A	N/A	0.002			
12/25/09 14:00	N/A	N/A	0.002			
12/25/09 15:00	N/A	N/A	0.002			
12/25/09 16:00	N/A	N/A	0.002			
12/25/09 17:00	N/A	N/A	0.002			
12/25/09 18:00	N/A	N/A	0.002			
12/25/09 19:00	N/A	N/A	0.002			
12/25/09 20:00	N/A	N/A	0.002			
12/25/09 21:00	N/A	N/A	0.002			
12/25/09 22:00	N/A	N/A	0.002			
12/25/09 23:00	N/A	N/A	0.002			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2,5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/26/09 0:00	N/A	N/A	0.002	0.002	5.1	4.9
12/26/09 1:00	N/A	N/A	0.002			
12/26/09 2:00	N/A	N/A	0.002			
12/26/09 3:00	N/A	N/A	0.002			
12/26/09 4:00	N/A	N/A	0.002			
12/26/09 5:00	N/A	N/A	0.002			
12/26/09 6:00	N/A	N/A	0.002			
12/26/09 7:00	N/A	N/A	0.002			
12/26/09 8:00	N/A	N/A	0.002			
12/26/09 9:00	N/A	N/A	0.002			
12/26/09 10:00	N/A	N/A	0.002			
12/26/09 11:00	N/A	N/A	0.002			
12/26/09 12:00	N/A	N/A	0.002			
12/26/09 13:00	N/A	N/A	0.002			
12/26/09 14:00	N/A	N/A	0.002			
12/26/09 15:00	N/A	N/A	0.002			
12/26/09 16:00	N/A	N/A	0.002			
12/26/09 17:00	N/A	N/A	0.002			
12/26/09 18:00	N/A	N/A	0.002			
12/26/09 19:00	N/A	N/A	0.002			
12/26/09 20:00	N/A	N/A	0.002			
12/26/09 21:00	N/A	N/A	0.002			
12/26/09 22:00	N/A	N/A	0.002			
12/26/09 23:00	N/A	N/A	0.002			
12/27/09 0:00	N/A	N/A	0.002	0.002	3.9	2.4
12/27/09 1:00	N/A	N/A	0.002			
12/27/09 2:00	N/A	N/A	0.002			
12/27/09 3:00	N/A	N/A	0.002			
12/27/09 4:00	N/A	N/A	0.002			
12/27/09 5:00	N/A	N/A	0.002			
12/27/09 6:00	N/A	N/A	0.002			
12/27/09 7:00	N/A	N/A	0.002			
12/27/09 8:00	N/A	N/A	0.002			
12/27/09 9:00	N/A	N/A	0.002			
12/27/09 10:00	N/A	N/A	0.002			
12/27/09 11:00	N/A	N/A	0.006			
12/27/09 12:00	N/A	N/A	0.012			
12/27/09 13:00	N/A	N/A	0.015			
12/27/09 14:00	N/A	N/A	0.014			
12/27/09 15:00	N/A	N/A	0.009			
12/27/09 16:00	N/A	N/A	0.006			
12/27/09 17:00	N/A	N/A	0.003			
12/27/09 18:00	N/A	N/A	0.002			
12/27/09 19:00	N/A	N/A	0.003			
12/27/09 20:00	N/A	N/A	0.003			
12/27/09 21:00	N/A	N/A	0.003			
12/27/09 22:00	N/A	N/A	0.003			
12/27/09 23:00	N/A	N/A	0.002			
12/28/09 0:00	N/A	N/A	0.002	0.004	5.5	5.0
12/28/09 1:00	N/A	N/A	0.002			

ODEC, Dendron, VA Ozone, SO <sub>2</sub> , and PM <sub>10</sub> Monitored Values December, 2009						
Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2,5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/28/09 2:00	N/A	N/A	0.002			
12/28/09 3:00	N/A	N/A	0.002			
12/28/09 4:00	N/A	N/A	0.003			
12/28/09 5:00	N/A	N/A	0.003			
12/28/09 6:00	N/A	N/A	0.003			
12/28/09 7:00	N/A	N/A	0.004			
12/28/09 8:00	N/A	N/A	0.003			
12/28/09 9:00	N/A	N/A	0.003			
12/28/09 10:00	N/A	N/A	0.003			
12/28/09 11:00	N/A	N/A	0.003			
12/28/09 12:00	N/A	N/A	0.003			
12/28/09 13:00	N/A	N/A	0.003			
12/28/09 14:00	N/A	N/A	0.003			
12/28/09 15:00	N/A	N/A	0.002			
12/28/09 16:00	N/A	N/A	0.002			
12/28/09 17:00	N/A	N/A	0.003			
12/28/09 18:00	N/A	N/A	0.003			
12/28/09 19:00	N/A	N/A	0.003			
12/28/09 20:00	N/A	N/A	0.003			
12/28/09 21:00	N/A	N/A	0.003			
12/28/09 22:00	N/A	N/A	0.003			
12/28/09 23:00	N/A	N/A	0.002			
12/29/09 0:00	N/A	N/A	0.002	0.003	6.2	6.4
12/29/09 1:00	N/A	N/A	0.002			
12/29/09 2:00	N/A	N/A	0.002			
12/29/09 3:00	N/A	N/A	0.002			
12/29/09 4:00	N/A	N/A	0.002			
12/29/09 5:00	N/A	N/A	0.002			
12/29/09 6:00	N/A	N/A	0.002			
12/29/09 7:00	N/A	N/A	0.002			
12/29/09 8:00	N/A	N/A	0.003			
12/29/09 9:00	N/A	N/A	0.003			
12/29/09 10:00	N/A	N/A	0.003			
12/29/09 11:00	N/A	N/A	0.003			
12/29/09 12:00	N/A	N/A	0.003			
12/29/09 13:00	N/A	N/A	0.004			
12/29/09 14:00	N/A	N/A	0.004			
12/29/09 15:00	N/A	N/A	0.005			
12/29/09 16:00	N/A	N/A	0.005			
12/29/09 17:00	N/A	N/A	0.005			
12/29/09 18:00	N/A	N/A	0.004			
12/29/09 19:00	N/A	N/A	0.003			
12/29/09 20:00	N/A	N/A	0.002			
12/29/09 21:00	N/A	N/A	0.002			
12/29/09 22:00	N/A	N/A	0.003			
12/29/09 23:00	N/A	N/A	0.003			
12/30/09 0:00	N/A	N/A	0.003	0.003	6.5	5.6
12/30/09 1:00	N/A	N/A	0.003			
12/30/09 2:00	N/A	N/A	0.003			
12/30/09 3:00	N/A	N/A	0.003			

ODEC, Dendron, VA  
 Ozone, SO<sub>2</sub>, and PM<sub>10</sub> Monitored Values  
 December, 2009

Date/Time	Ozone 1-Hr*	Avg. 8 Hr Ozone*	Avg. 3 Hr SO <sub>2</sub>	Avg. Daily 24 Hr SO <sub>2</sub>	Avg. Daily 24 Hr PM <sub>10</sub>	Avg. Daily 24 Hr PM <sub>2.5</sub>
	ppb	ppm	ppm	ppm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
	Avg	Avg	Avg	Avg	Avg	Avg
12/30/09 4:00	N/A	N/A	0.003			
12/30/09 5:00	N/A	N/A	0.003			
12/30/09 6:00	N/A	N/A	0.003			
12/30/09 7:00	N/A	N/A	0.004			
12/30/09 8:00	N/A	N/A	0.004			
12/30/09 9:00	N/A	N/A	0.004			
12/30/09 10:00	N/A	N/A	0.005			
12/30/09 11:00	N/A	N/A	0.006			
12/30/09 12:00	N/A	N/A	0.007			
12/30/09 13:00	N/A	N/A	0.008			
12/30/09 14:00	N/A	N/A	0.008			
12/30/09 15:00	N/A	N/A	0.006			
12/30/09 16:00	N/A	N/A	0.006			
12/30/09 17:00	N/A	N/A	0.008			
12/30/09 18:00	N/A	N/A	0.009			
12/30/09 19:00	N/A	N/A	0.009			
12/30/09 20:00	N/A	N/A	0.007			
12/30/09 21:00	N/A	N/A	0.005			
12/30/09 22:00	N/A	N/A	0.004			
12/30/09 23:00	N/A	N/A	0.004			
12/31/09 0:00	N/A	N/A	0.003	0.005	6.2	7.1
12/31/09 1:00	N/A	N/A	0.003			
12/31/09 2:00	N/A	N/A	0.003			
12/31/09 3:00	N/A	N/A	0.002			
12/31/09 4:00	N/A	N/A	0.002			
12/31/09 5:00	N/A	N/A	0.002			
12/31/09 6:00	N/A	N/A	0.002			
12/31/09 7:00	N/A	N/A	0.002			
12/31/09 8:00	N/A	N/A	0.002			
12/31/09 9:00	N/A	N/A	0.002			
12/31/09 10:00	N/A	N/A	0.002			
12/31/09 11:00	N/A	N/A	0.002			
12/31/09 12:00	N/A	N/A	0.002			
12/31/09 13:00	N/A	N/A	0.002			
12/31/09 14:00	N/A	N/A	0.002			
12/31/09 15:00	N/A	N/A	0.002			
12/31/09 16:00	N/A	N/A	0.002			
12/31/09 17:00	N/A	N/A	0.002			
12/31/09 18:00	N/A	N/A	0.002			
12/31/09 19:00	N/A	N/A	0.002			
12/31/09 20:00	N/A	N/A	0.002			
12/31/09 21:00	N/A	N/A	0.002			
12/31/09 22:00	N/A	N/A	0.002			
12/31/09 23:00	N/A	N/A	0.002			
1/1/10 0:00	N/A	N/A	0.002	0.002	6.6	8.6

\*Ozone season is from April 1 through October 31.

## DENDRON METEOROLOGICAL DATA

Dendron Meteorological Data  
Is on Accompanying CD  
(Dendron\_Dec09.xls)

**PM<sub>10</sub> and PM<sub>2.5</sub> FLOW CHECKS,  
SO<sub>2</sub>, SPAN, AND PRECISION (ZSP)  
WORKSHEETS, AND STANDARD  
CERTIFICATIONS**

**Inquest Environmental, Inc.**  
**Continuous PM10 Sampler**  
**Flow/Leak Check Verification Spreadsheet**

Monitor ID	ODEC Cypress Creek		
Date	12/02/2009	Start Time	2:30pm
Technician	J. Kunkel		
Sampler Model	Teom Series 1400a		
Serial Number	30203		
TEOM Temp (deg C)	14.8		
TEOM Pressure (atm)	0.996		

<b>Total Flow Check Device</b>		<b>Main Flow Check Device</b>	
Make	Chinook	Make	Chinook
Model	Streamline	Model	Streamline
Serial #	991107	Serial #	698
Slope (m)	0.3981	Slope (m)	0.1165
Intercept (b)	-0.5812	Intercept (b)	-0.2009
Calibration Expires	2/20/2010	Calibration Expires	2/20/2010

	Operating Flow Rates			Flow Check Rates					
	Flow Rate Set Points l/min	Monitor Display l/min	Deviation %	Limit %	Flow Device "H2O	Flow Device Qact	Qact Deviation l/min	Qact Limit l/min	
Total	16.67	16.81	0.84	+/- 2.0	6.40	16.54	-0.13	+/- 1.00	17.056
Main	3.00	2.99	-0.33	+/- 2.0	2.60	2.99	-0.01	+/- 0.20	3.086

Leak Check		
	Monitor Display l/min	Limit l/min
Auxiliary	0.19	< 0.60
Main	0.10	< 0.15

Calculations:

$$\text{DegC} = (\text{DegF} - 32) / 1.8$$

$$\text{DegK} = \text{DegC} + 273$$

$$\text{mmHg} = \text{"Hg} * 25.4$$

$$\text{atm} = \text{mmHg} / 760$$

$$\text{Qact l/min} = (\text{m} * \text{sqrt}(\text{"H2O} * (\text{degK} / \text{atm}))) + \text{b}$$

$$\text{Qstd l/min} = \text{Qact} * (298 / \text{local degK}) * (\text{local atm} / 1)$$

**Inquest Environmental, Inc.**  
**Continuous PM10 Sampler**  
**Flow/Leak Check Verification Spreadsheet**

Monitor ID	ODEC Cypress Creek		
Date	12/16/2009	Start Time	3:15pm
Technician	J. Kunkel	Stop Time	3:40pm
Sampler Model	Teom Series 1400a		
Serial Number	30203		
TEOM Temp (deg C)	8.0		
TEOM Pressure (atm)	1.015		

<b>Total Flow Check Device</b>	<b>Main Flow Check Device</b>
Make	Chinook
Model	Streamline
Serial #	991107
Slope (m)	0.3981
Intercept (b)	-0.5812
Calibration Expires	2/20/2010
Make	Chinook
Model	Streamline
Serial #	698
Slope (m)	0.1165
Intercept (b)	-0.2009
Calibration Expires	2/20/2010

<b>Flow Rate Set Points</b> l/min	<b>Operating Flow Rates</b>			<b>Flow Check Rates</b>				
	<b>Monitor Display</b> l/min	<b>Deviation</b> %	<b>Limit</b> %	<b>Flow Device</b> "H2O	<b>Flow Device</b> Qact	<b>Qact Deviation</b> l/min	<b>Qact Limit</b> l/min	<b>Flow Device</b> Qstd
<b>Total</b> 16.67	16.70	0.18	+/- 2.0	6.50	16.31	-0.36	+/- 1.00	17.552
<b>Main</b> 3.00	3.00	0.00	+/- 2.0	2.60	2.92	-0.08	+/- 0.20	3.148

<b>Leak Check</b>		
	<b>Monitor Display</b> l/min	<b>Limit</b> l/min
<b>Auxiliary</b>	0.34	< 0.60
<b>Main</b>	0.06	< 0.15

**Calculations:**

$$\text{DegC} = (\text{DegF} - 32) / 1.8$$

$$\text{DegK} = \text{DegC} + 273$$

$$\text{mmHg} = \text{"Hg} * 25.4$$

$$\text{atm} = \text{mmHg} / 760$$

$$\text{Qact l/min} = (\text{m} * \text{sqrt}(\text{"H2O} * (\text{degK} / \text{atm}))) + \text{b}$$

$$\text{Qstd l/min} = \text{Qact} * (298 / \text{local degK}) * (\text{local atm} / 1)$$

**Inquest Environmental, Inc.**  
**Continuous PM<sub>2.5</sub> Sampler Check**

Station Name Cypress Creek  
 Location Dendron, VA  
 Date December 02 2009  
 Operator J. Kunkel  
 Sampler Met One BAM 1020  
 Serial No. J6869  
 Start time 2:55 PM  
 Stop Time 3:40 PM

**Flow Transfer Standard**

Make/Model	<u>Chinook Streamline</u>
Serial No.	<u>991107</u>
Slope (m)	<u>0.3981</u>
Intercept (b)	<u>-0.5812</u>
Certified	<u>2/20/2009</u>

Sampler Flow Rate		Std Flow Rate		Flow Check Results			
Design LPM	Indicated LPM	Manometer "H <sub>2</sub> O	Audit LPM	Difference LPM	Difference Percent	Design % Diff	
16.70	16.70	6.30	16.39	0.31	1.91	-1.87	
Criteria			±4 %			±5 %	

Leak Check	
Leakage LPM	Audit LPM
0.50	<1.0 LPM

**Temperature Std. Device**

Make/Model Delta Cal  
 Serial No. 0709  
 Certified 5/20/2009

**B. P. Std. Device**

Make/Model Delta Cal  
 Serial No. 0709  
 Certified 5/20/2009

Ambient Temperature Audit		
Sampler	Std.	Difference
14.5	15.0	-0.5
Criteria	±2 °C	

Barometric Pressure Audit		
Sampler	Std.	Difference
757.0	759.0	-2.0
Criteria	±10 mmHg	

Calculations:

$$\text{Audit Flow Rate } (Q_{act}) = m \times \text{SQRT}("H_2O \times (\text{Audit Temperature} + 273) / (\text{Audit Pressure}/760)) + b$$

$$\text{Difference Percent} = (\text{Indicated Flow} - \text{Audit Flow}) / \text{Audit Flow} \times 100$$

$$\text{Design \% Difference} = (\text{Audit Flow} - \text{Design Flow}) / \text{Design Flow} \times 100$$

**Inquest Environmental, Inc.**  
**Continuous PM<sub>2.5</sub> Sampler Check**

Station Name Cypress Creek  
 Location Dendron, VA  
 Date December 16, 2009  
 Operator J. Kunkel  
 Sampler Met One BAM 1020  
 Serial No. J6869  
 Start time 8:05 AM  
 Stop Time 9:00 AM

**Flow Transfer Standard**

Make/Model	<u>Chinook Streamline</u>
Serial No.	<u>991107</u>
Slope (m)	<u>0.3981</u>
Intercept (b)	<u>-0.5812</u>
Certified	<u>2/20/2009</u>

Sampler Flow Rate		Std Flow Rate		Flow Check Results		
Design LPM	Indicated LPM	Manometer "H <sub>2</sub> O	Audit LPM	Difference LPM	Difference Percent	Design % Diff
16.70	16.70	6.80	16.62	0.08	0.45	-0.45
			Criteria	<u>±4 %</u>		<u>±5 %</u>

Leak Check	
Leakage LPM	Audit Criteria
0.20	<1.0 LPM

**Temperature Std. Device**  
 Make/Model Delta Cal  
 Serial No. 0709  
 Certified 5/20/2009

**B. P. Std. Device**  
 Make/Model Delta Cal  
 Serial No. 0709  
 Certified 5/20/2009

Ambient Temperature Audit		
Sampler	Std.	Difference
3.8	4.6	-0.8
Criteria	<u>±2 °C</u>	

Barometric Pressure Audit		
Sampler	Std.	Difference
770.0	768.0	2.0
Criteria	<u>±10 mmHg</u>	

Calculations:

$$\text{Audit Flow Rate } (Q_{act}) = m \times \text{SQRT}("H_2O \times (\text{Audit Temperature} + 273) / (\text{Audit Pressure}/760)) + b$$

$$\text{Difference Percent} = (\text{Indicated Flow} - \text{Audit Flow}) / \text{Audit Flow} \times 100$$

$$\text{Design \% Difference} = (\text{Audit Flow} - \text{Design Flow}) / \text{Design Flow} \times 100$$

**Inquest Environmental, Inc.**  
**Continuous PM<sub>2.5</sub> Sampler Check**

Station Name Cypress Creek  
 Location Dendron, VA  
 Date December 23, 2009  
 Operator J. Kunkel/D Vann  
 Sampler Met One BAM 1020  
 Serial No. J6869  
 Start time 2:30 PM  
 Stop Time 3:00 PM

**Flow Transfer Standard**

Make/Model	<u>Chinook Streamline</u>
Serial No.	<u>991107</u>
Slope (m)	<u>0.3981</u>
Intercept (b)	<u>-0.5812</u>
Certified	<u>2/20/2009</u>

<b>Sampler Flow Rate</b>		<b>Std Flow Rate</b>		<b>Flow Check Results</b>		
Design LPM	Indicated LPM	Manometer "H <sub>2</sub> O	Audit LPM	Difference LPM	Difference Percent	Design % Diff
16.70	16.70	6.60	16.47	0.23	1.38	-1.36
				Criteria	±4 %	±5 %

<b>Leak Check</b>	
Leakage LPM	Audit Criteria
0.40	<1.0 LPM

**Temperature Std. Device**

Make/Model Delta Cal  
 Serial No. 0709  
 Certified 5/20/2009

**B. P. Std. Device**

Make/Model Delta Cal  
 Serial No. 0709  
 Certified 5/20/2009

**Ambient Temperature Audit**

Sampler	Std.	Difference
8.4	8.0	0.4
Criteria	±2 °C	

**Barometric Pressure Audit**

Sampler	Std.	Difference
767.6	768.0	-0.4
Criteria	±10 mmHg	

Calculations:

$$\text{Audit Flow Rate } (Q_{act}) = m \times \text{SQRT}("H_2O \times (\text{Audit Temperature} + 273) / (\text{Audit Pressure}/760)) + b$$

$$\text{Difference Percent} = (\text{Indicated Flow} - \text{Audit Flow}) / \text{Audit Flow} \times 100$$

$$\text{Design \% Difference} = (\text{Audit Flow} - \text{Design Flow}) / \text{Design Flow} \times 100$$

# ***Inquest Environmental Air Monitoring Network***

## **SO2 Analyzer ZSP Worksheet**

Location ODEC Cypress Creek  
Parameter SO2

Date 12/2/2009  
Technician J Kunkel  
Start Time 2:00 pm  
Stop Time 2:35 pm

### **Calibration System**

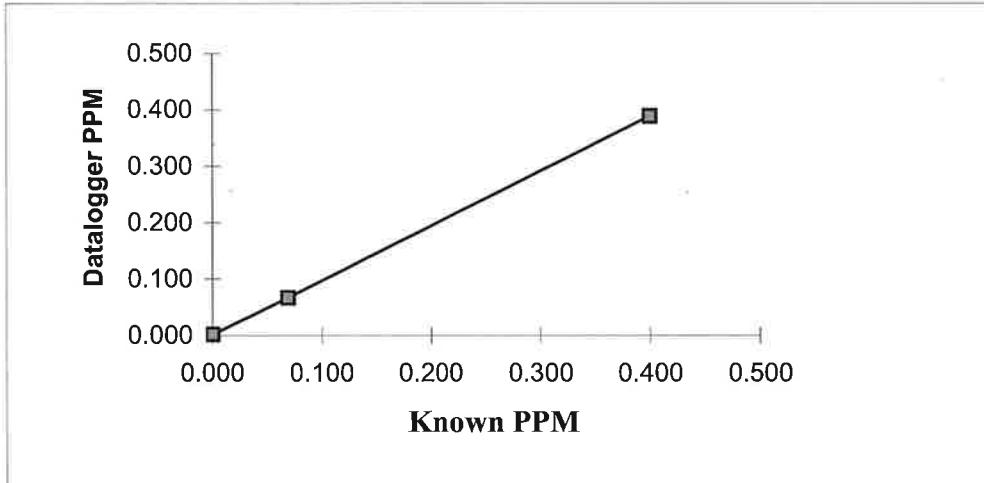
Model Environics  
Serial No. 3626  
Gas Tank EBOO13837  
Tank Press 2100  
Tank PPM 50.1

Model Teco 43C  
Serial No. 60995-329  
F/S Volts 1.00  
F/S PPM 0.50

### **Zero Span Precision Check Results**

Setting	Known PPM	Datalogger Response	PPM Difference	Percent Difference
Level 1	0.400	0.389	-0.011	-2.8
Level 4	0.069	0.067	-0.002	-2.9
Level 0	0.000	0.002	0.002	xxxx

Average Difference -2.8  
Standard Deviation 0.1  
Upper 95% Probability Limit -2.6  
Lower 95% Probability Limit -3.0



**Inquest Environmental Air Monitoring Network**  
SO2 Analyzer ZSP Worksheet

Location ODEC Cypress Creek  
Parameter SO2

Date 12/16/2009  
Technician J Kunkel  
Start Time 12:10 pm  
Stop Time 12:45 pm

**Calibration System**

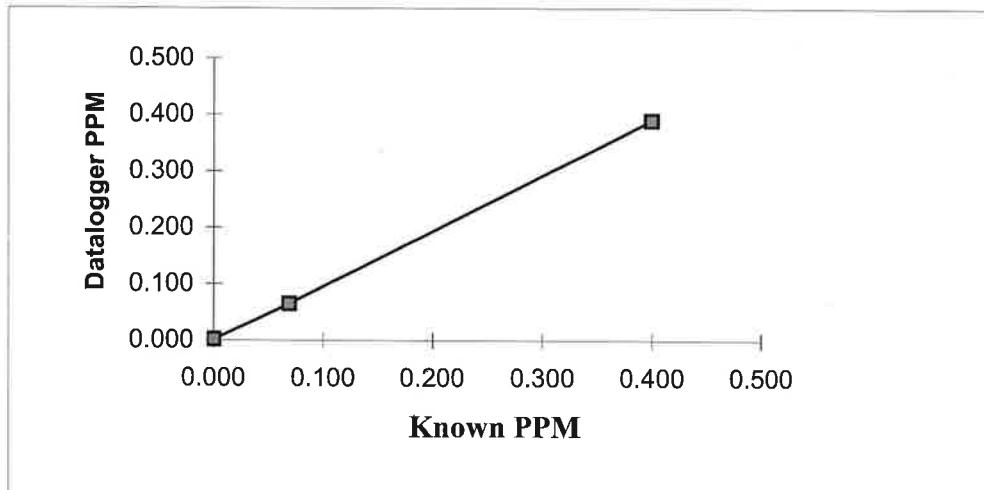
Model Environics  
Serial No. 3626  
Gas Tank EBOO13837  
Tank Press 2000  
Tank PPM 50.1

Model Teco 43C  
Serial No. 60995-329  
F/S Volts 1.00  
F/S PPM 0.50

**Zero Span Precision Check Results**

Setting	Known PPM	Datalogger Response	PPM Difference	Percent Difference
Level 1	0.400	0.390	-0.010	-2.5
Level 4	0.069	0.065	-0.004	-5.8
Level 0	0.000	0.002	0.002	xxxx

Average Difference -4.1  
Standard Deviation 2.3  
Upper 95% Probability Limit 0.4  
Lower 95% Probability Limit -8.7



***Inquest Environmental Air Monitoring Network***  
**SO2 Analyzer ZSP Worksheet**

Location    ODEC Cypress Creek  
Parameter    SO2

Date    12/23/2009  
Technician    J Kunkel/D Vann  
Start Time    1:05 pm  
Stop Time    1:30 pm

**Calibration System**

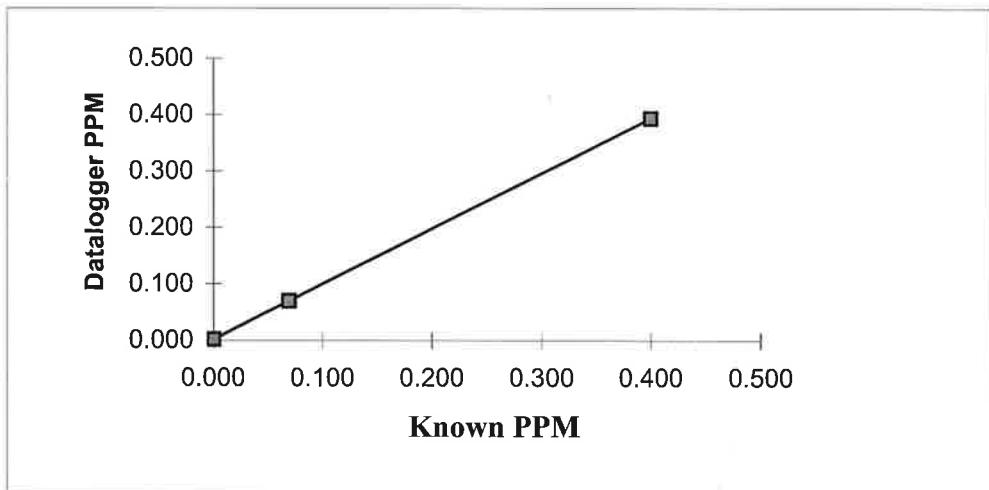
Model    Environics  
Serial No.    3626  
Gas Tank    EBOO13837  
Tank Press    2000  
Tank PPM    50.1

Model    Teco 43C  
Serial No.    60995-329  
F/S Volts    1.00  
F/S PPM    0.50

**Zero Span Precision Check Results**

Setting	Known PPM	Datalogger Response	PPM Difference	Percent Difference
Level 1	0.400	0.394	-0.006	-1.5
Level 4	0.069	0.070	0.071	1.4
Level 0	0.000	0.002	0.002	xxxx

Average Difference                                    0.0  
Standard Deviation                                    2.1  
Upper 95% Probability Limit                        4.1  
Lower 95% Probability Limit                        -4.1



# ***Inquest Environmental Air Monitoring Network***

## SO2 Analyzer Multi Point Calibration Worksheet

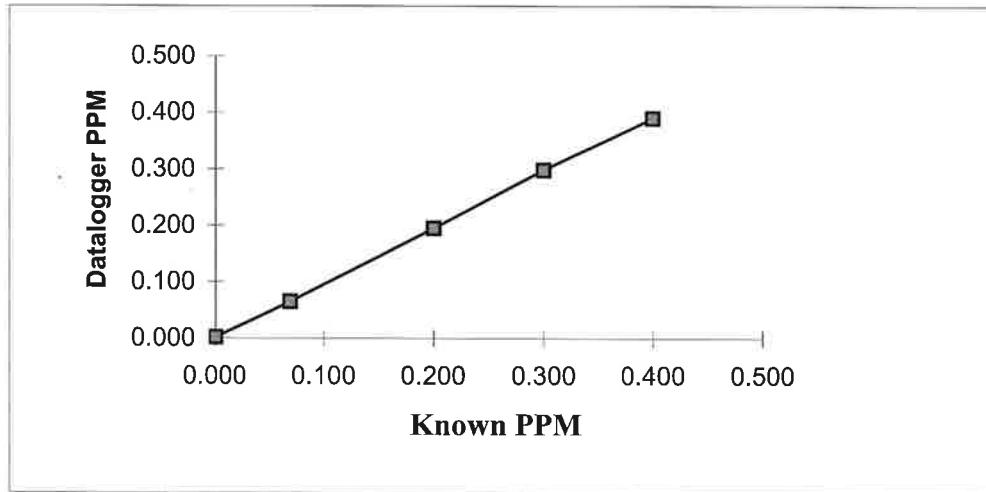
Location	ODEC Cypress Creek	Date	12/16/2009
Parameter	SO2	Technician	J. Kunkel
		Start Time	12:50 pm
		Stop Time	1:45 pm

Calibration System		Analyzer Information	
Model	Environics 4040	Model	Teco 43C
Serial No.	3626	Serial No.	43C-60995-329
Gas Tank	EBOO13837	F/S Volts	1.00
Tank Press	2000	F/S PPM	0.50
Tank PPM	50.1		

### Multipoint Calibration Results

Setting	Known PPM	Datalogger Response	PPM Difference	Percent Difference
Level 1	0.400	0.390	-0.010	-2.5
Level 2	0.300	0.298	-0.002	-0.7
Level 3	0.200	0.195	-0.005	-2.5
Level 4	0.069	0.065	0.079	-5.8
Level 0	0.000	0.002	0.002	xxxx

Average Difference	-2.9
Standard Deviation	2.1
Upper 95% Probability Limit	1.3
Lower 95% Probability Limit	-7.1



## VERIFICATION OF OZONE TRANSFER STANDARD

DATE 16-Mar-09 PHOTOMETER DASIBI  
 LOCATION AQUA Lab MODEL NO. 5008  
 AGENCY Inquest SERIAL NO. 471  
 LAB REP. K. Simon SAMPLE FREC 375K  
 CONTROL FRE 373K  
 SPAN NO. NA  
 TEMPERATUR AUTO  
 PRESSURE AUTO  
 AIR FLOW 2.0LPM  
 PHOTO FLOW 1.90LPM



Missouri  
Department of  
Natural Resources

TRANSFER  
STANDARD TECO 49C SAMPLE FREQUENCY: 67923  
 MODEL NO. PS CONTROL FREQUENCY: 93905  
 SERIAL NO. 60939 TEMPERATURE: 31.1  
 AGENCY INQUEST PRESSURE: 738.6  
 SPAN NUMBER: 1.01  
 OFFSET -0.3  
 AIR FLOW  
 PHOTO FLOW 0.788

Start on High O3 Conc. For #1

REFERENCE PHOTOMETER

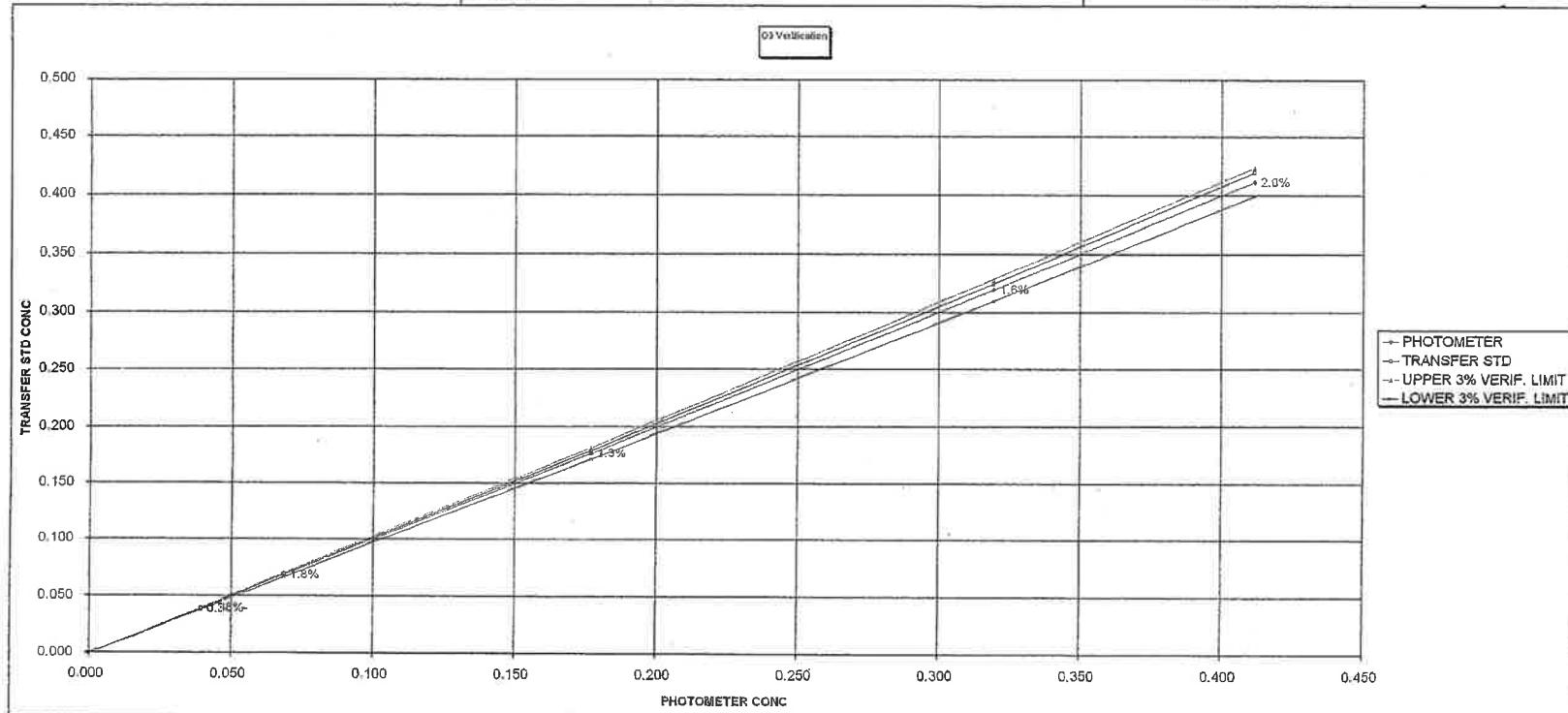
reading no.	0	1	2	3	4	5	0
1	0.001	0.411	0.319	0.177	0.048	0.039	0.001
2	0.001	0.411	0.319	0.177	0.068	0.039	0.001
3	0.001	0.411	0.319	0.177	0.068	0.039	0.001
4	0.001	0.411	0.319	0.177	0.068	0.039	0.001
5	0.000	0.411	0.319	0.177	0.068	0.039	0.001
6	0.000	0.412	0.319	0.177	0.069	0.040	0.000
7	0.001	0.412	0.319	0.177	0.069	0.041	0.000
8	0.000	0.412	0.320	0.177	0.069	0.041	0.000
9	0.001	0.412	0.320	0.177	0.070	0.040	0.000
10	0.001	0.411	0.320	0.177	0.070	0.040	0.000
average	0.0007	0.4114	0.3193	0.1770	0.0687	0.0397	0.0005
zero adjust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
total	0.4114	0.3193	0.1770	0.0687	0.0397		

SLOPE 1.012879  
 INTERCEPT -0.000045  
 CORR 0.999999  
 No. of Observations 6

REFERENCE	0.4114	0.3193	0.1770	0.0687	0.0397
TRANSFER STD	0.4197	0.3246	0.1794	0.0700	0.0396
% DIFFERENCE	2.01%	1.64%	1.33%	1.82%	-0.36%

COMMENTS: Teco 49C generator settings are .000, .420, .925, .180, .070, .040  
 UPPER 3% VERIF. LIMIT LOWER 3% VERIF. LIMIT

reading no.	0	1	2	3	4	5	0
1	0.001	0.419	0.325	0.178	0.070	0.040	0.001
2	0.001	0.419	0.324	0.179	0.070	0.040	0.001
3	0.000	0.419	0.324	0.179	0.070	0.039	0.000
4	0.000	0.420	0.325	0.179	0.070	0.039	0.000
5	0.000	0.420	0.325	0.180	0.070	0.039	0.000
6	0.000	0.419	0.324	0.180	0.070	0.040	0.000
7	0.000	0.420	0.325	0.180	0.070	0.040	-0.001
8	0.000	0.421	0.325	0.180	0.070	0.040	-0.001
9	0.001	0.420	0.325	0.180	0.070	0.040	0.000
10	0.000	0.421	0.325	0.179	0.071	0.040	0.000
average	0.0003	0.4198	0.3247	0.1795	0.0701	0.0397	0.0000
zero adjust	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	
total	0.4197	0.3246	0.1794	0.0700	0.0398		



**Inquest Environmental, Inc.**  
**Dilution Calibrator Flow Calibration**

Date 8/17/2009  
Technician C. Boston

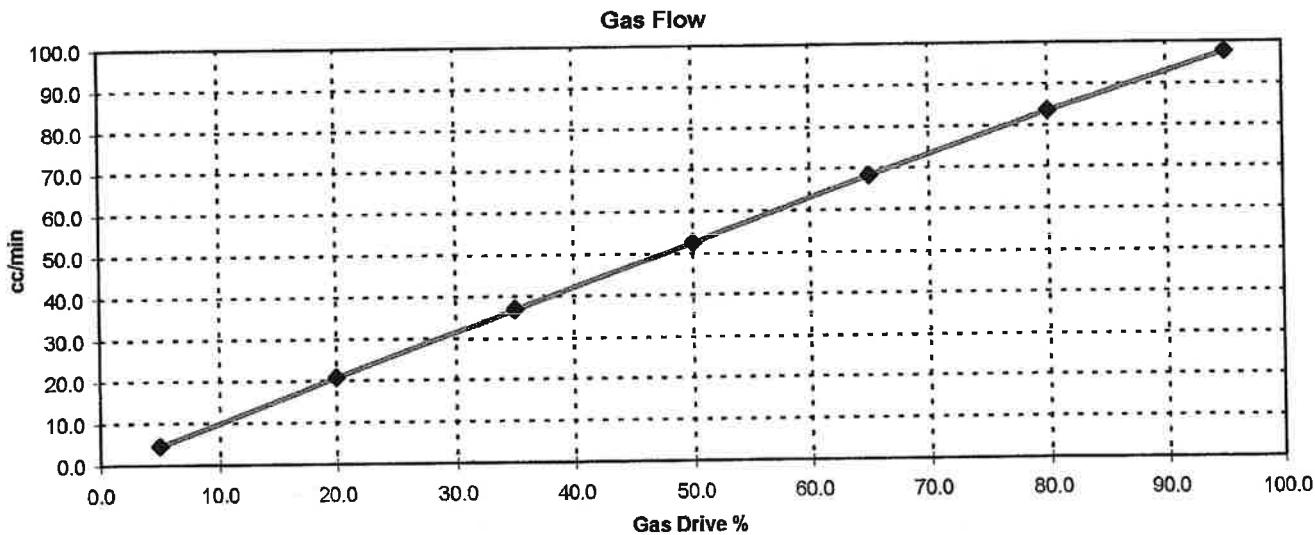
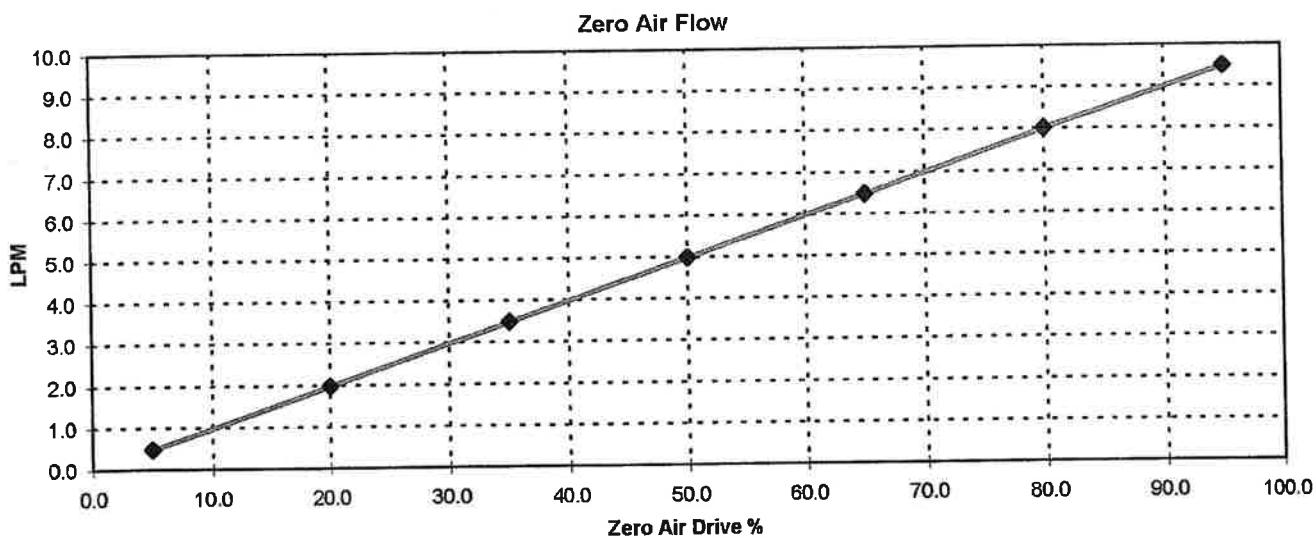
Make/Model Teco 146C  
Serial No. 645

Zero Air					
Drive %	Press mm Hg	Temp °C	Bios Display	Relative Volume	Flow LPM
95	742.2	22.8	9.651	1.016	9.495
80	742.2	22.8	8.147	1.016	8.015
65	742.2	22.8	6.592	1.016	6.485
50	742.2	22.8	5.086	1.016	5.004
35	742.2	22.8	3.549	1.016	3.492
20	742.2	22.8	2.018	1.016	1.985
5	742.2	22.8	0.495	1.016	0.487

Slope 0.10018  
Intercept -0.0144  
Correlation 1.00000

Gas					
Drive %	Press mm Hg	Temp °C	Bios Display	Relative Volume	Flow cc/min
95	742.2	22.8	99.40	1.016	97.79
80	742.2	22.8	85.06	1.016	83.69
65	742.2	22.8	69.53	1.016	68.41
50	742.2	22.8	53.62	1.016	52.75
35	742.2	22.8	37.55	1.016	36.94
20	742.2	22.8	21.23	1.016	20.89
5	742.2	22.8	4.67	1.016	4.59

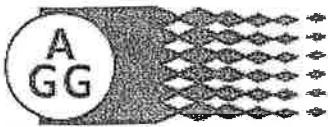
Slope 1.03970  
Intercept 0.1664  
Correlation 0.99978



Cylinder ID EB0015037

Gas SO<sub>2</sub>

Concentration 55.70



THE AMERICAN GAS GROUP

SPECIALTY GASES OF AMERICA, INC.  
AMERICAN INDUSTRIAL GASES, INC.  
AMERICAN RARE GASES, INC.6055 BRENT DR. TOLEDO, OH 43611  
419-729-7732 FAX 419-729-2411

www.americangasgroup.com

## ANALYTICAL REPORT

**Certificate ID:** 061209029      **Date:** 6/12/2009

**Customer Name:** Linweld - Waverly

**Customer Address:** 9920 Deerpark Rd  
Waverly NE 68462

**Purchase Order:** SG08834      **Work Order:** 089888-02

**Lot Number:** 0527HB09      **Product Name:** 2-Component Mixture, EPA Protocol

**Size:** 31A      **Pressure:** 2015 psig @ 70 Deg F

**Content:** CN:GASMA424

**Serial #:** EB0015037

**Analysis Date:** 6/11/2009

**Shelf Life:** 24 months      **Expiration Date:** 6/11/2011

<u>Component</u>	<u>Nominal</u>	<u>Actual</u>	<u>Accuracy</u>	<u>Method</u>
Sulfur Dioxide	55.0 ppm	55.7 ppm	+/- 1% rel	NDUV
Nitrogen	Balance	Balance		

REFERENCE STANDARD	<u>Std Type</u>	<u>Std #</u>	<u>Cyl #</u>	<u>Concentration</u>	<u>Exp Date</u>
	GMIS	1117HG08	EB0004415	95.8000	2/12/2011

INSTRUMENTATION	<u>Instrument / ID</u>	<u>Component</u>
	Ametek WR Series 900	SO2

**Note:** \* ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION  
OF GASEOUS CALIBRATION STANDARDS - SEPTEMBER 1997:G1  
\* DO NOT USE STANDARD WHEN PRESSURE IS BELOW 150 PSIG

  
**Protocol**  
Specialty Gases of America, Inc.Issued by: Josh Jones

# Certificate of Calibration

Streamline™ flow transfer standard (FTS) # 040495  
was calibrated against NIST traceable critical flow venturis  
S/Ns 10961, 10962, 10963, 18491, 30421 on: 9/18/2009

This calibration expires: 9/18/2010

r5

The actual flow rate ( $Q_a$ ) through the FTS is:

$$Q_a = \left[ m \times \left( \sqrt{\frac{(\Delta P)(T_{amb})}{P_{amb}}} \right) \right] + b$$

$$m = 0.0904$$

$$b = -0.1967$$

$Q_a$  = actual flow rate in liters/minute

$\Delta P$  = pressure reading from the manometer in "H<sub>2</sub>O

$T_{amb}$  = ambient temperature in Kelvins

$P_{amb}$  = ambient pressure in atmospheres\*

\* 1 atmosphere = 760 mmHg, = 29.92" Hg, = 101,325 Pa

Reviewed: RLS

Date: 9/18/2009

## Quality Assurance Check

Primary Standard $Q_{actual}$ (l/min)	Streamline FTS $\Delta P$ ("H <sub>2</sub> O)	Streamline FTS $Q_{line fit}$ (l/min)	Absolute Difference (l/min)	% Difference* full scale
6.01	14.01	6.04	0.03	0.48%
5.09	10.01	5.07	-0.01	-0.23%
4.16	6.76	4.13	-0.03	-0.43%
3.24	4.22	3.22	-0.02	-0.25%
2.32	2.29	2.33	0.01	0.16%
1.40	0.95	1.43	0.02	0.41%
0.50	0.17	0.49	-0.01	-0.13%

$$T_a (\text{°C}) = 23.4$$

$$\text{Pa (atm)} = 0.874$$

$$r = 0.9999$$

\*all points must be within ±2%

*Chinook Engineering*

A Division of Inter-Mountain Laboratories, Inc.

555 Absaraka Street

Sheridan, Wyoming 82801 USA

(307) 672-7790

[chinook@imlinc.com](mailto:chinook@imlinc.com)

Streamline™ FTS, US Patent #5792966

# Certificate of Calibration

Streamline™ flow transfer standard (FTS) # 040409  
was calibrated against NIST traceable critical flow venturis  
S/Ns 10961, 10962, 10963, 18491, 30421 on: 9/18/2009

This calibration expires: 9/18/2010

r5

The actual flow rate ( $Q_a$ ) through the FTS is:

$$Q_a = \left[ m \times \left( \sqrt{\frac{(\Delta P)(T_{amb})}{P_{amb}}} \right) \right] + b$$

$$m = 0.4146$$

$$b = -0.3556$$

$Q_a$  = actual flow rate in liters/minute

$\Delta P$  = pressure reading from the manometer in "H<sub>2</sub>O

$T_{amb}$  = ambient temperature in Kelvins

$P_{amb}$  = ambient pressure in atmospheres\*

\* 1 atmosphere = 760 mmHg, = 29.92" Hg, = 101,325 Pa

Reviewed: RLS

Date: 9/18/2009

## Quality Assurance Check

Primary Standard $Q_{actual}$ (l/min)	Streamline FTS $\Delta P$ ("H <sub>2</sub> O)	Streamline FTS $Q_{line fit}$ (l/min)	Absolute Difference (l/min)	% Difference* full scale
20.02	7.14	20.04	0.02	0.09%
17.50	5.47	17.50	-0.01	-0.04%
14.99	4.04	14.99	-0.01	-0.03%
12.49	2.84	12.50	0.01	0.03%
9.98	1.83	9.96	-0.02	-0.11%
7.49	1.05	7.47	-0.02	-0.08%
5.00	0.50	5.03	0.03	0.15%

$$T_a (\text{°C}) = 23.1$$

$$\text{Pa (atm)} = 0.874$$

$$r = 1.0000$$

\*all points must be within ±2%

*Chinook Engineering*

A Division of Inter-Mountain Laboratories, Inc.

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(307) 672-7790

[chinook@imlinc.com](mailto:chinook@imlinc.com)

Streamline™ FTS, US Patent #5792966



**CALIBRATION PROCEDURE  
18801/18810 ANEMOMETER DRIVE**

**DWG: CP18801(A)**

REV: C101107 PAGE: 2 of 3  
BY: TJT DATE: 10/11/07  
CHK: JC W.C. GAS-12

**CERTIFICATE OF CALIBRATION AND TESTING**

MODEL: 18801 (Comprised of Models 18820 Control Unit & 18830 Motor Assembly)  
SERIAL NUMBER: 60731

R. M. Young Company certifies that the above equipment was inspected and calibrated prior to shipment in accordance with established manufacturing and testing procedures. Standards established by R.M. Young Company for calibrating the measuring and test equipment used in controlling product quality are traceable to the National Institute of Standards and Technology.

Nominal Motor Rpm	Output Frequency Hz (1)	Calculated Rpm (2)	Indicated Rpm (3)
600	320	600	600
1200	640	1200	1200
2400	1280	2400	2400
4200	2240	4200	4200
6,000	3200	6000	6000
8,100	4320	8100	8100
9,900	5280	9900	9900
<input checked="" type="checkbox"/> Clockwise and Counterclockwise rotation verified			

- (1) Measured at the optical encoder output.  
(2) Frequency output produces 32 pulses per revolution of motor shaft.  
(3) Indicated on the Control Unit LCD display.

\* Indicates out of tolerance

No Calibration Adjustments Required       As Found       As Left

Traceable frequency meter used in calibration Model: DPS740 SN: 4863

Date of inspection 1/13/09  
Inspection Interval One Year

Tested By RP



# Calibration complies with ISO 9001 ISO/IEC 17025 AND ANSI/NCSL Z540-1



Calibration  
Certificate No. 1750.01

Cert. No.: 4000-2102824

## Traceable® Certificate of Calibration for Digital Thermometer

### Instrument Identification:

Inquest Environmental Inc., 3609 Mojave Ct. Suite E, Attn. Mitchell Kunkel, Columbia, MO 65202 U.S.A. (RMA:946634)

Model: 15-077-8 S/N: 221381405 Manufacturer : Control Company

Model: 15-077-7 S/N: 51202300

### Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC191	A79341		
Thermistor Module	A17118	11/08/09	A8B10067
Temperature Probe	3039	11/26/09	A8B11055
Temperature Probe	149	3/06/09	A82225037-3
Thermistor Module	A27129	8/22/09	1000248949
Temperature Calibration Bath TC218	A73332		

### Certificate Information:

Technician: 68 Procedure: CAL-06 Cal Date: 1/28/09 Cal Due: 1/28/10  
Test Conditions: 23.0°C 35.0 %RH 1025 mBar

### Calibration Data:

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±uc	TUR
°C	0.001	0.096	N	0.001	-0.003	Y	-0.049	0.051	0.013	3.8:1
°C	25.001	25.105	N	25.001	24.998	Y	24.951	25.051	0.013	3.8:1
°C	60.001	60.142	N	60.001	60.000	Y	59.951	60.051	0.018	2.8:1
°C	100.001	100.103	N	100.001	99.999	Y	99.951	100.051	0.013	3.8:1

### This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±uc=Measurement Uncertainty; TUR=Test Uncertainty Ratio;  
Accuracy=±(Max-Min)/2; Min = Nominal(Rounded) - Tolerance; Max = Nominal(Rounded) + Tolerance; Date=MM/DD/YY

Wallace Berry, Technical Manager

### Maintaining Accuracy:

In our opinion once calibrated your Digital Thermometer should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Digital Thermometers change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

### Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA  
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Control Company is an ISO 17025:2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.  
Control Company is ISO 9001:2000 Quality Certified by (DNV) Det Norske Veritas, Certificate No. CERT-01805-AQ-HOU.  
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).



## CALIBRATION CERTIFICATE

**Instrument Details :**

Instrument : Hand-Held Digital Barometer  
 Serial Number : 914861-A4  
 Calibration Certificate No. : 800450A

Model No. : 230-355  
 ID Number :

Page 1 of 1

**Customer Details:**

Ref PO . MK010709B RA 901903


**Environmental Details :**

Temperature 25°C ± 4° Relative Humidity 32 % ± 10% Barometric Pressure 971 hpa ±10hpa

Calibration / Checking Procedure :Document 230-355-A06

Date Received : Jan. 13, 2009  
 Cal Date : Jan. 20, 2009


**Calibration Results:**

Test Value Millimeters mb	Expected Value	Observed Reading millibars	Acceptable Limit
641.2 mb	641.2 mb	641.3 mb	± 0.2 mb
749.9 mb	749.9 mb	750.0 mb	± 0.2 mb
859.2 mb	859.2 mb	859.4 mb	± 0.2 mb
969.4 mb	969.4 mb	969.4 mb	± 0.2 mb
1046.0 mb	1046.0 mb	1046.1 mb	± 0.2 mb


**Comments:**

Received with Units In.Hg , Calibration was done with units set to millibars , for higher resolution .



As Received Readings on were 6 mb (0.17 in. hg ) Low , Reset to Original Factory Zero Settings and added an offset of +4mb to obtain correct readings .

Battery AS Received was low @ 7.6 vdc, Replaced with New Battery 9.2V



This device has been tested with the following calibration devices;

Fluke Model 87 SN 50501646 | B-246-S SN 1021 | 230-M202 SN0851103062  
Cal Due : May 15 , 2009 | Cal Due : Sept 14, 2009 | Cal Due : Dec.. 22, 2009

All Calibration Standards have an accuracy ratio of 2:1 or better unless otherwise stated.

Calibration performed at the NovaLynx Factory , Auburn CA

NovaLynx Corporation certifies that the above referenced products were calibrated and tested using standards whose calibrations are traceable to the National Institute of Standards and Technology.

Work was completed according to the manufactures calibration procedures and specifications and complies with ANSI-Z540 and Former MIL-STD-45662A.

This report shall Not be reproduced except in full without the written approval of NovaLynx Corporation

Technician : William Begg  
 William Begg, Service Manager, NovaLynx

Date : Jan 20, 2009



Calibration  
Certificate No. 1750.01

# Calibration complies with ISO 9001 ISO/IEC 17025 AND ANSI/NCSL Z540-1



Cert. No.: 4087-2102795

## Traceable® Certificate of Calibration for Digital Hygrometer Thermometer

### Instrument Identification:

Inquest Environmental Inc., 3609 Mojave Ct. Suite E, Attn. Mitchell Kunkel, Columbia, MO 65202 U.S.A. (RMA:946634)

Model: 11-661-8

S/N: L468153

Manufacturer : Control Company

### Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Digital Thermometer	41334977/41335007	10/08/09	4000-2003183
Multimeter	49150872	5/27/09	1000244305
Chilled Mirror Hygrometer	31874/H2048MCR	9/29/09	7101

### Certificate Information:

Technician: 61 Procedure: CAL-19 Cal Date: 1/28/09 Cal Due: 1/28/10  
Test Conditions: 24.0°C 31.0 %RH 1022 mBar

### Calibration Data:

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±uc	TUR
°C	25.55	24.30	N	25.78	25.80	Y	25.38	26.18	0.07	>4:1
%RH	20.629	22.00	Y	19.788	20.60	Y	18.29	21.29	0.870	1.7:1
%RH	34.063	35.20	Y	33.215	32.50	Y	31.72	34.72	0.870	1.7:1
%RH	73.600	75.90	N	72.442	73.00	Y	70.94	73.94	0.870	1.7:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±uc=Measurement Uncertainty; TUR=Test Uncertainty Ratio;  
Accuracy=(Max-Min)/2; Min = Nominal(Rounded) - Tolerance; Max = Nominal(Rounded) + Tolerance; Date=MM/DD/YY

Wallace Berry, Technical Manager

### Maintaining Accuracy:

In our opinion once calibrated your Digital Hygrometer Thermometer should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Digital Hygrometer Thermometers change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

### Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA  
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Control Company is an ISO 17025:2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.  
Control Company is ISO 9001:2000 Quality Certified by (DNV) Det Norske Veritas, Certificate No. CERT-01805-AQ-HOU.  
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).

# CERTIFICATE of CALIBRATION

## for LI-COR SENSOR

Pyranometer  
Model Number: LI-200

Serial Number: PY66037

Calibration Date: July 10, 2009  
Manufacture Date: July 10, 2009

### Calibration Constant:

Output: 94.74 microamps per 1000 watts m<sup>-2</sup>

### For use with LI-COR handheld meters:

Multiplier: -10.56 watts m<sup>-2</sup> per microamp

### For use with LI-COR 2220 (147 ohm) Millivolt Adapter:

Multiplier: -71.81 watts m<sup>-2</sup> per millivolt

### If this is an SL sensor:

Multiplier: -100.0 watts m<sup>-2</sup> per millivolt

**IMPORTANT:** Read the appropriate instruction manual (<http://www.licor.com/TSM>) before using this sensor.

**IMPORTANT:** It is recommended that sensors be recalibrated every two years.

Calibration Technician: Canon Osborne

Calibration standard used: Eppley Model PSP, serial number 32758F3.  
Calibration traceable to the World Radiation Reference at the World Radiation Center in Davos, Switzerland through Eppley Laboratory Inc.



LI-COR Biosciences • Environmental • 4421 Superior Street • P.O Box 4425 • Lincoln, NE 68504 USA

Phone: (1) 402-467-3576 • Fax: 402-467-2819 • Toll-free: 800-447-3576 (USA & Canada)

[envsales@licor.com](mailto:envsales@licor.com) • [envsupport@licor.com](mailto:envsupport@licor.com) • [www.licor.com](http://www.licor.com)

Manual: <http://www.licor.com/TSM>

*REBS*

Radiation & Energy Balance Systems, Inc.

P.O. Box 40203  
Bellevue, WA 98015-4203  
Phone: (206) 624-7221  
Fax: (425) 228-4067

May 6, 2009

Inquest Environmental, Inc.  
3609 Mojave Ct., Ste E  
Columbia, MO 65202  
Tom Bagby  
573-474-8110

Dear Sir,

We have recalibrated your instrument. Listed below is the calibration information. Please record the calibration information in your records.

SERIAL NUMBER Q04041

	POSITIVE ZERO WIND CF	NEGATIVE ZERO WIND CF
ORIGINAL CAL. FACTOR	$10.29 \text{ Wm}^{-2}\text{mV}^{-1}$	$12.64 \text{ Wm}^{-2}\text{mV}^{-1}$
<u>NEW DOME CAL. FACTOR</u>	<u><math>10.43 \text{ Wm}^{-2}\text{mV}^{-1}</math></u>	<u><math>12.97 \text{ Wm}^{-2}\text{mV}^{-1}</math></u>

If you have further questions please contact us.

Sincerely,

Charles Fritschen

## METEOROLOGICAL DATA